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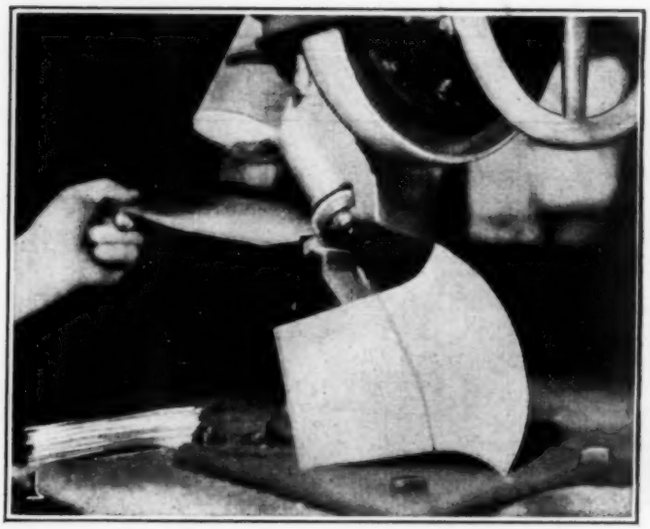


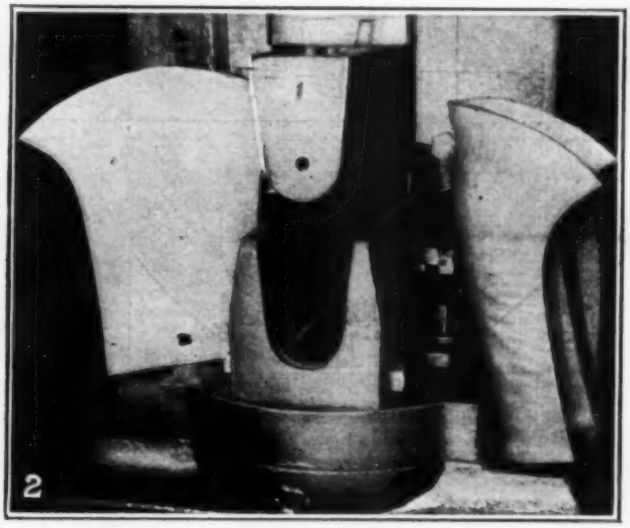


Fig. 1—Main sections are cut by a rotary shear. Fig. 2—The first press operation in forming the bell

Interchangeable Manufacture of Saxophones

By Frank W. Curtis
Western Editor, American Machinist

RECENT improvements in the methods of manufacturing saxophones, as carried out at the plant of the Buescher Band Instrument Company, Elkhart, Ind., have placed the product in the so-called interchangeable class, whereas but a few years ago it was made almost entirely by hand, necessitating individual fitting for each instrument. While many of the operations performed differ considerably from the average run of shop work, some of them closely resemble operations handled in connection with ordinary sheet-metal work.

Production requirements do not warrant the construction of special tools for each operation, but where such devices can be employed economically, they have been provided. For example, in cutting out the three main sections of a saxophone, namely: the body, the bow, and the bell, all of which are made of 20-gage sheet-brass, templets are used to lay out the forms, after which a bench-type rotary shear, such as illustrated in Fig. 1, is used to cut out the profiles. The part shown is a bell blank, of which two pieces are laid out on a single sheet and then cut out as shown.

Next in line, the bells are formed in two press operations, the first of which is illustrated in Fig. 2, giving the blank a U-shape. A blank is shown at the left, while at the right may be seen one that has been formed. After a quantity have been completed, the second operation dies are mounted in the press, which in turn close in the edges of the bell, so that they nearly meet.

Preparatory to brazing, one edge of the bell is "notched," leaving tongues protruding at about seven places. The notches are approximately $\frac{1}{16}$ in. in width. Then, the bell is formed and hammered by hand, so that its edges meet, after which the tongues are hammered over the opposite edge by hand on an anvil, thus holding the edges of the bell together. In Fig. 3 is illustrated at *A*, a bell as received from the press, while the other examples to be seen on the brazing rack have had their edges joined as outlined. In brazing the ends together,

The first part of the article. The conclusion will appear in an early issue.

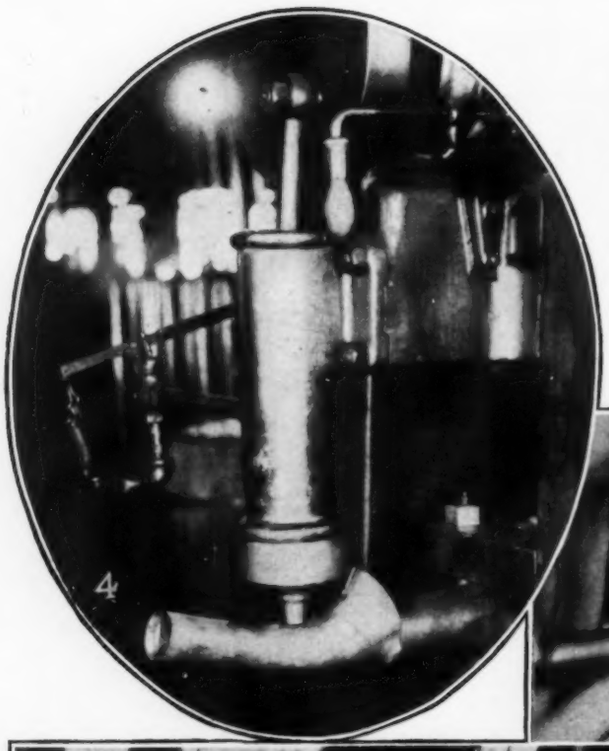
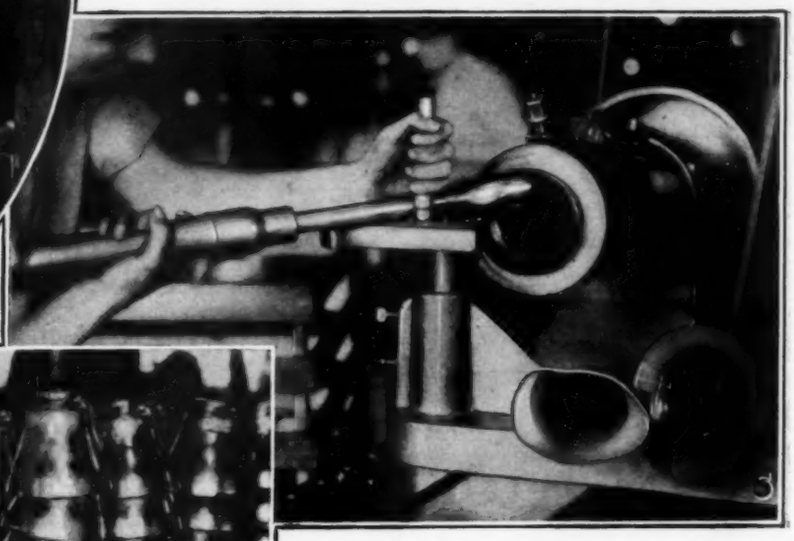


Fig. 4—The brazed seam is hammered in this machine so that the thickness of the bell at the seam will not exceed that of the balance of the metal. The work is placed over a horn anvil, and the seam is completed at one end, after which the bell is turned around so that the opposite end can be hammered

Fig. 5—Following an annealing operation, the outer end of the bell is spun by placing the work in a formed chuck and drawing a ball-shaped tool over the inner surface as the work revolves. The bell is held in place by a wooden block driven in the open end and by a strap clamp attached at the smaller end. Oil is used so that a smooth finish will be produced



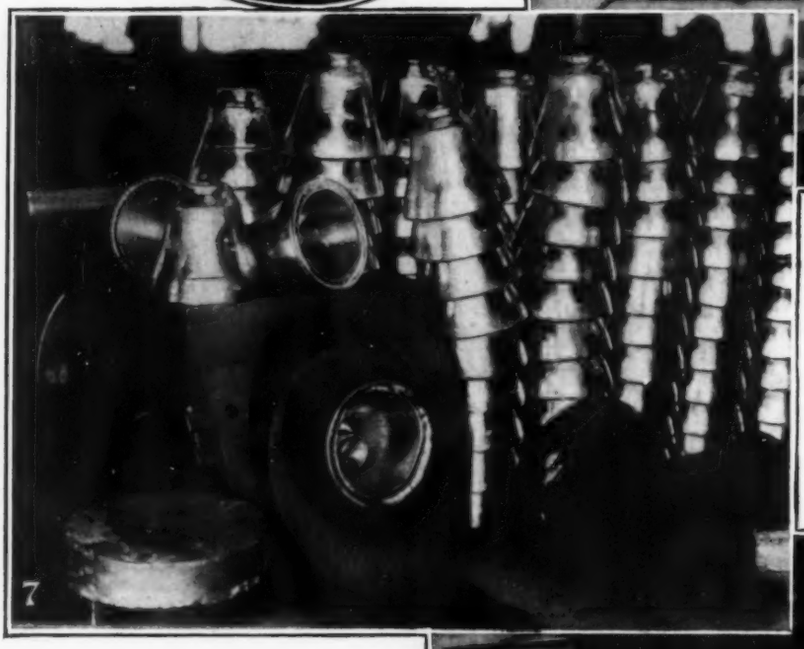


Fig. 7 — After being spun, the bell is again annealed preparatory to being ironed out in a drawing machine as shown. The bell is lubricated and is placed in a die, then a cast lead slug is placed in the bell and connected to the drawbar of the machine. As the slug is drawn through the work, it collapses, but at the same time smooths the surface of the bell

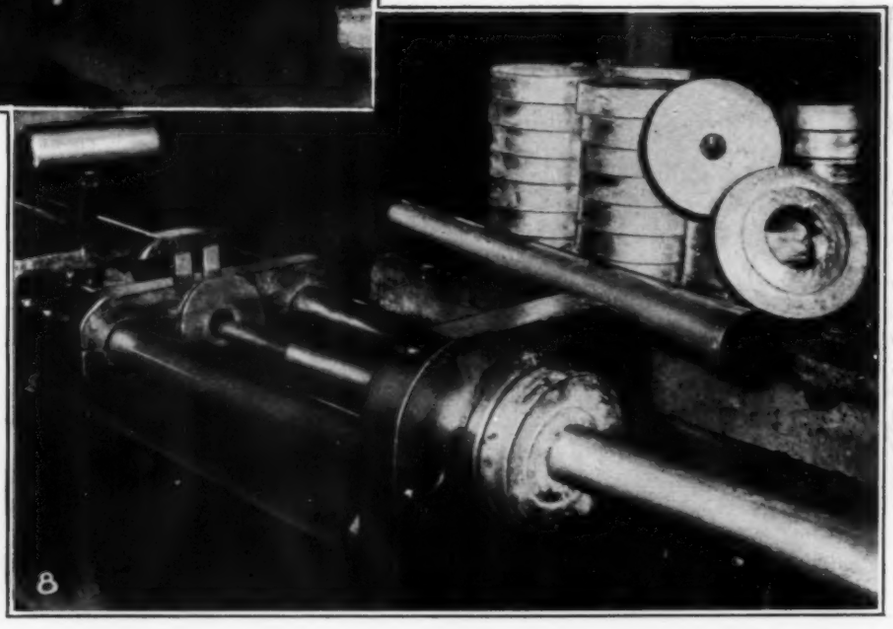


Fig. 8 — Saxophone bodies are made in a manner similar to that followed in making bells, requiring shearing, forming, brazing, and annealing. The body is smoothed in a drawing machine, being placed over a tapered mandrel and then drawn through a lead ring. The hole in the lead ring enlarges as the work is drawn through it and the pressure irons out the body

Fig. 3—One edge of the bell is notched, leaving tongues protruding at about seven places, then the edges are joined together by hand, after which the tongues are hammered over the opposite edge. Several bells are placed on a rack provided with V-shaped plates, and are then brazed in a group

the surface of the seam on the inside of the bell is covered with borax, while on the outside spelter is placed. The joint is completed by the application of a gas flame from a torch.

After being brazed, the seam is straightened and flattened by the air hammer illustrated in Fig. 4. The bell is fitted over a mandrel, or horn, that can be changed to suit the size of the work being made. First, one end is hammered by moving the bell along the mandrel as the machine is in operation, then the opposite end is treated in a similar manner. This operation smooths out the seam and brings its thickness to approximately that of the balance of the metal.

After being hammered, the seam is annealed by a gas torch, then the bell end is spun to form, as shown in Fig. 5. The work it fitted into a form chuck, being held in place by a formed wooden block driven in the open end, and a strap clamp that holds the small end. Details of the chuck are shown in Fig. 6. The work is oiled before it is spun to insure a smooth finish. Bells before and after spinning may be seen in Fig. 5 in the foreground.

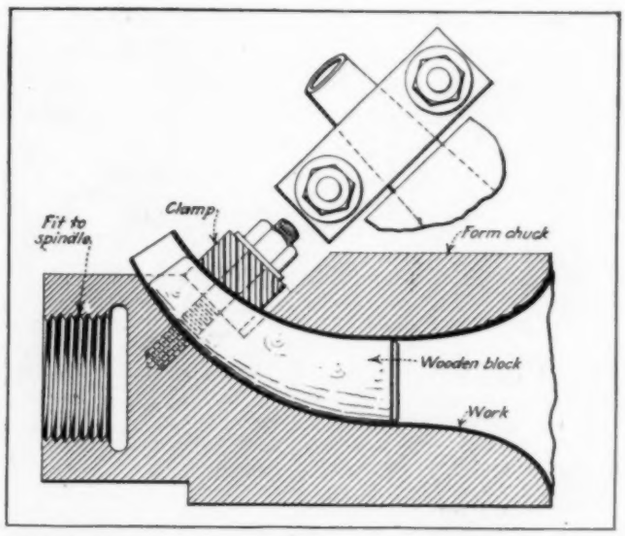


Fig. 6—Constructional features of the form chuck used in spinning the large end of bells. The clamp is tightened against the work after the wooden block has been inserted as shown

Again the bell is annealed to remove whatever strains may have been set up during spinning, and then it is ironed out as shown in Fig. 7 in the special machine. The bell is fitted into a die, after which a lead slug, resembling the bell yet somewhat larger than the diameter of the work, is placed in the open end and connected to the draw bar of the machine. Oil soap, or an olive-oil emulsion, is applied to the bell surface before the ironing is started. The lead slug, being cored out, collapses as it is drawn through the work, yet the pressure exerted as it passes through the bell irons out all wrinkles and produces a smooth surface of the shape and size desired. After a wire has been beaded in the large end of the bell, it is ready for the final operations.

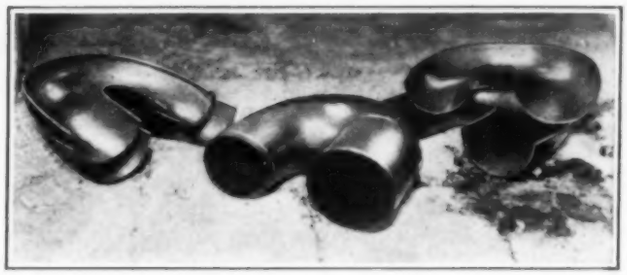


Fig. 9—The bows are made from two sections of sheet brass requiring a forming operation to bring them to shape. The two parts are wired together in the center, and then the seams are brazed. The seams are hammered by hand

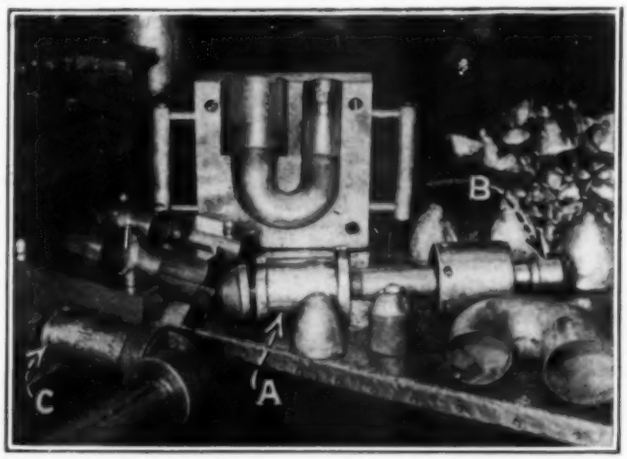


Fig. 10—To smooth out wrinkles in the bow, a lead slug is forced through the bend by hydraulic pressure. The bow and the lead slug are placed in a split die, which is then closed and clamped. The water line is then connected to one of the die openings, and the lead slug forced through

Bodies are made in a similar manner, being sheared to shape, formed in a press, notched, brazed, and then drawn as illustrated in Fig. 8. This operation, although having the same purpose as the previous one described for the bell, operates in the opposite way by having a lead ring that is held stationary while the body is drawn through it. A mandrel is placed in the body, which is then put in the lead ring and connected to the movable member of the machine. The mandrel and work are pulled through the ring, which is 1 in. in width. Bar soap, rubbed on the body, is used as a lubricant for the operation. The opening in the ring is $\frac{7}{8}$ in. in diameter when new, and $2\frac{3}{8}$ in. in diameter after the work is passed through it.

Bows are made from two pieces, sheared from flat

stock, and formed and joined together as illustrated in Fig. 9. Before being wired together for brazing, the edges are smoothed by a rotary file. After brazing, the seams are hammered, although this operation is done by hand over a special mandrel.

Wrinkles in the bow are removed by a lead slug as in the case of bells and bodies, although on account of the shape, the operation is handled by hydraulic pressure furnished by a three-stage pump. As illustrated in Fig. 10, the bow is placed in a split die, then a lead slug $\frac{1}{4}$ in. larger in diameter than the hole in the work, is inserted in the larger end of the die. The union *A* is also connected in the same opening. When the die is closed it is clamped to prevent the pressure from opening it, after which the opposite end *B*, of the union, is connected to the feed line *C*. The water pressure forces the slug through the bow, thus removing all wrinkles and completing its form to correspond with that of the die. The inside of the bow is coated with lubricant for this operation.

System for Handling Contract Orders

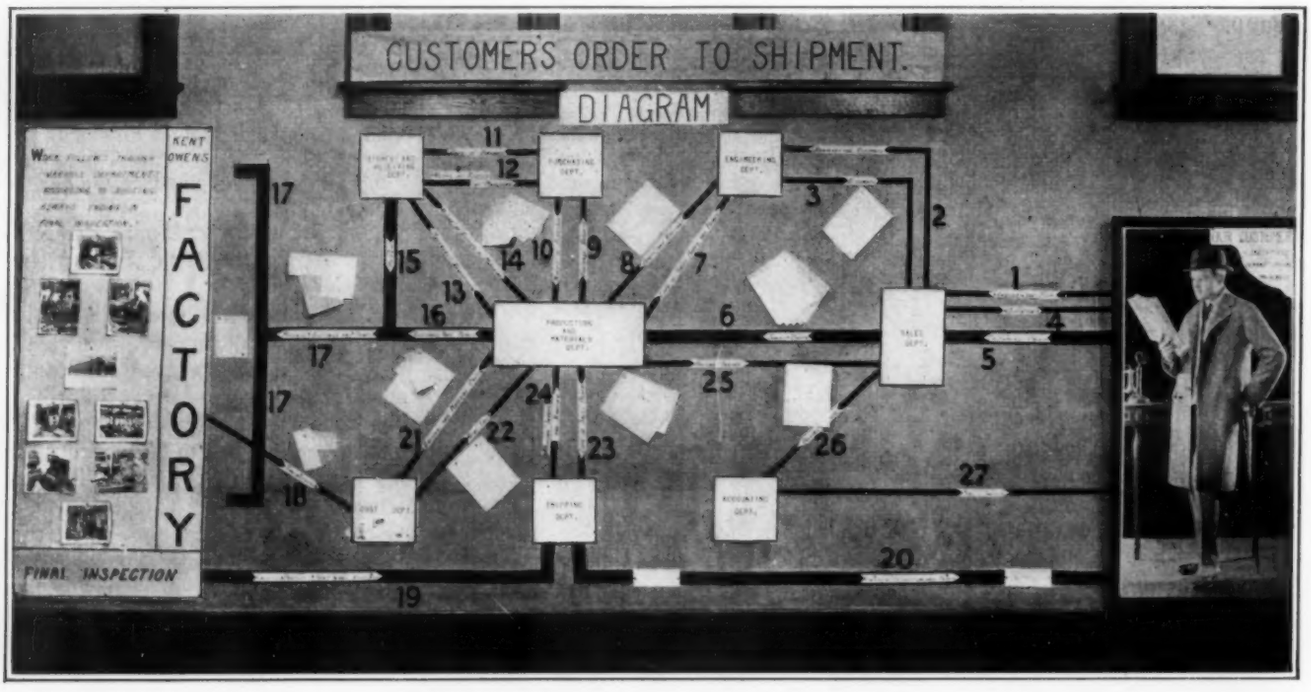
By Edmund E. Burke

WHEN an inquiry for a bid on a special machine is received by the sales department at the plant of the Kent-Owens Machine Company, the sales manager requests the engineering department for an estimate; on this estimate the quotation is then made. On receipt of an order, the sales department makes up the shop order, retaining one copy and sending four copies to the production and materials department, which department makes the proper stock entries on the stock record card and fills in information on the production, shipping, and engineering copies of the order.

The production and materials department then requests the necessary engineering data, and blueprints and shop routings for the material are supplied. At the same time, the production and materials department sends a purchase request to the purchasing department. When the purchase is made, a notice of such is sent to the production and materials department, and also one to the stores and receiving department. When the material is received, the latter department sends a notice of receipt of material to the purchasing department. The material is released from the stores on a materials requisition sent out by the production and materials department.

The blueprints and routings follow with the materials through the various departments in the factory, as designated by the routing, until final inspection is reached. As the job progresses, accurate time records are kept, these being sent in daily to the cost department. From inspection, the finished product, together with the prints and routings, is sent to the shipping department, and the shipping department takes care that the prints are sent to the customer with the finished product.

For the purpose of making out the sales invoice, material costs are supplied by the production and materials department to the cost department. This material cost, together with the labor cost obtained from the time tickets and the burden applied by the cost department, gives a unit cost and a total cost for each part on each order. The cost department sends this cost to the production and materials department. The shipping department, which had received a copy of the sales order, sends a billing invoice and the routing to the production and materials department, and the routing card of the completed job goes into the cost department records from the production and materials department. The latter department supplies the unit cost to the billing invoice, and then sends it to the sales department, from where it goes into the accounting department. The accounting department finally sends the sales invoice to the customer. This completes the shop end of the transaction.



A wall display showing the factory routing of orders

Paying Express Charges on Replacements

BILL HOLLAND and his friend Charles Luther, a user of electrical machinery, were banging away on the golf course. They had talked politics, news, shows, and books and then had just naturally drifted over to business, as good business men will while playing, all resolutions to the contrary notwithstanding.

"I bought an electrical machine the other day and one of the castings let go the third day it was in operation. Flaw in the casting, Bill. So I sent it back, express collect, and they replaced it. But they sent it C.O.D. express charges both ways. Is that usual? If it is, it's a bad custom, and doesn't appeal to me as being fair in any way."

"That isn't a new problem, Charley—and it seems to be more or less customary, even though it isn't exactly fair from a strictly ethical viewpoint."

"But it's their fault—no casting that isn't sound should go into a machine—and if it does it ought to be replaced absolutely free of charge. It's no fault of mine that it isn't discovered before it leaves the shop."

"True enough, Charley. But it's a fairly universal custom just the same. You'll find it in your automobile guaranty, which holds for ninety days only. Defective parts will be replaced if they are sent, charges prepaid, to the factory. And they'll generally charge you the cost of returning the new part. Furthermore, the cost of putting it in place is also up to you, unless you can induce the local agent to do it for you."

"It's bad enough to lose production on the machine without having to pay for the expressage and labor of putting the part in place, Bill. How do they justify that?"

"Some of them figure that many of the parts they replace are not really defective but have been broken by carelessness. If they assume all costs of replacement it might tend to cover up carelessness on the part of the user or his men. Others contend that replacements of this kind occur so seldom that they don't count."

"Seems to me that's all the more reason they should make good, free of all cost to the user. I'm not sure but what you could collect damages if a machine fails to make its guaranteed production due to a fault in the machine itself."

"I don't know a thing about law suits, Charley, except to keep out of them. I'm only telling you the custom in many industries. It often happens, however, that the agent or dealer you buy through makes good on the whole damage. He replaces the broken part from stock, sends the defective piece back to the factory and gets credit for it. A real agent of this kind can save a manufacturer a lot of grief, and can frequently boost his reputation for fairness higher than if you dealt direct with the factory.

"I think some of the large mail order houses pay expressage or postage both ways on defective goods, too, Charley. But I don't believe the practice is as general as might be expected. One large automobile company some years ago replaced a lot of rear axles free of charge, including the cost of removing the old and installing the new. Where they didn't have a service station they sent a check with the new axle, covering the cost of putting it in place in the average repair shop."

"The replacement problem is probably worth a lot more study than seems to have been given it, Bill. I'd like to know what experience others have had."

Executives are invited to discuss the problem involved in the foregoing case. Accepted contributions will be paid for.

Discussion

Vacations—Singly, or All at Once?

Almost every modern organization believes in vacations for workers, but scheduled production is difficult to maintain and the established teamwork of the plant interfered with when vacation periods are scattered. With one vacation on top of another, time is wasted, and alternative

absences demoralize the force. Every one tries to carry the load of someone else. Aside from this, the efficiency of the company is impaired at a time when the natural tendency of the weather is to reduce the workers' producing power.

A uniform vacation makes it possible to keep production and sales at high level. The plant can produce more if it runs continuously, and close down a specified number of days for the vacation period, during which time maintenance repairs, machine changes, and improvements are made. —A. GORDON.

The staggered vacation period generally aims to give the employees their vacation when they desire it, if at all possible. Establishing a single period for the concern often breaks up a family vacation, where there are several working members in the employ of different concerns. The value of a vacation to the employee lies in what he does with his time. Giving him all possible leeway in fixing his vacation period aids him in obtaining the maximum benefit. When the employee picks his own time and runs into a lot of bad weather he will accept it as his own misfortune, but if the time is set, he'll surely growl against the company about it. This may seem trivial and unreasonable, but it will happen. And last, but not least, any new plan must obviously be better, not merely equal to the one it is planned to supersede. —JOSEPH J. PURDY.

No one likes a half-way job or a half-hearted attempt to grant something. If vacations are to be given, they should be given wholeheartedly, at a time that does the employee the most good. It is wrong to restrict employees' families to a definite period each year, regardless of their personal likes and dislikes. One person likes to go in hot weather, another in June when the fish bite, another goes south in October, and still another likes the hunting season. It is a poor organization that has no substitutes or understudies to fill temporary vacancies. —J. PATON.

A Question of Family Income

An association of manufacturers, founded for the purpose of free exchange of surplus labor, would certainly be a beneficial enterprise, while the exceptional simplicity for the disposition of employees would prove a boon to the manufacturer and the workman. Industry would then always be assured of acquiring promptly high caliber labor, and labor would be assured of employment suitable to it. Every year, hundreds and perhaps thousands, of highly skilled and efficient workmen are out on the open market, whereas other manufacturers are scanning the field in a vain effort to acquire the same grade of labor. If such an association were properly developed and functioning, a continuous and detrimental factor would be considerably minimized, if not entirely eliminated. —HARRY C. LAMB.

From the point of view of management, it would not be unjustifiable to install new machinery, providing the new machinery was able to save the company money through decreased cost of production. In the case of workers of Ed Smiley's type, the company may seem to have its own selfish interest at heart in discharging them. But when it is considered that these days are very competitive, the company is only protecting itself by releasing unnecessary high-priced workers and employing cheaper labor that can do the job just as effectively with the aid of the new improved machinery.

A system whereby all manufacturing companies would endeavor to maintain a co-operative labor exchange to take care of workers of Ed Smiley's type, who were discharged through no fault of their own, would be highly successful in alleviating the discharged worker's hardship in securing another job. —GEORGE H. GUNN.

The very fact that Carey admits that his conscience bothers him every time he passes Ed Smiley's house, shows that down in his heart he knows that he blundered. He says that it would be difficult for Ed to find another job in the town, but in order to make a good showing for himself he laid Ed off to save money for the firm. But, did he save any money for the firm?

He overlooked the fact that he was losing a lot of good will from the other employees. Here, Ed had worked faithfully for this firm for years. Had bought his home in this small town depending on the firm to give him steady work as long as he was able to work. He showed confidence in his employers, and then along comes Mr. Carey, a young "super" seeking to make a reputation for himself, and dumps poor Ed out in the world when he is too old to begin to learn another trade. This does not seem to be just.

The firm owed Ed a position, and there is no doubt but that there was some kind of position that he could have filled. The firm's treatment to Ed will make the other employees feel as though they are only regarded as human machines to be thrown out as soon as they have outlived their usefulness. Carey cannot expect very much of an effort from his employees when they are in this frame of mind. On the other hand, if he had kept Ed on the job, or found some kind of a job for him, Ed would have worked faithfully and always been a booster for the firm. The other employees would feel as though they were working for a reliable firm, and results would have been far better.

Too many superintendents, in their efforts

to cut down the firm's expenses, overlook the fact that the attitude of the employees toward the firm and toward the executives is far more important than any results from attention paid to the equipment in the shops. —Wm. J. Owens.

That a company which has specialized the ability of a man of keen intellect along a certain line for years, owes that man the opportunity to adjust himself if that special field is suddenly discontinued, is generally accepted and practiced. But, in the case of a man of no particular ability or adaptability, who doesn't seem to fit in anywhere else, the company has no real responsibility in that it has not penalized his opportunities, nor handicapped his prospects. In fact, he is just that much better off for the amount of steady work he has had.

Mr. Carey, the superintendent, being personally acquainted with the case, and in the light of community interest and civic spirit, may well try to aid the man in question. But his interest would represent that of any good citizen interested in the welfare of his fellow man, and would in no sense be a company responsibility. In addition to the possibility of a labor exchange under the guidance of the manufacturer's association, it might be a final act of appreciation on the company's part to insert an advertisement in the local paper in behalf of any individual laid off because of conditions beyond his control. Often, such a man simply does not know how to go about getting a job, or else goes after the kind he is incapable of filling. It is quite certain that something should have been done in the matter.

—William C. Wise.

Getting Ideas from the Men

It has been my experience that the best way to get new ideas from the men is through the medium of the suggestion box. Many men are naturally timid, and are afraid to approach their foreman with a new idea which they may have developed, for fear they may not be able to explain it correctly and put it across successfully. The use of the suggestion box, however, gives a man a chance to work out his idea on paper to the best of his ability and to supplement it with sketches, if necessary.

However, while I have seen the suggestion box working to good advantage, I have also seen it fail miserably. But in general the success achieved is usually commensurate with the interest put into the scheme by the management.

To make such a scheme a success it is necessary to institute some method of rewarding the contributors of usable ideas for their efforts, as all men naturally expect value for value contributed. This rewarding may take the form of an honor roll posted in the shop, listing the names of the successful contributors, or a periodic dinner, but by far the best results that I have seen were obtained by rewarding the men in cash.

In this respect all suggestions were first considered by a suggestion committee, and those that appeared usable were referred to the engineering department for a detailed investigation. In this investigation any cost involved of changing present equipment or purchasing new equipment was considered along with the saving in labor and material that could be effected over a period of one year. If the investigation showed that the saving, if any, was worth while, the idea was accepted and the contributor was paid a percentage of the saving effected during the first year.

In the case of contributions that were rejected, a letter was written to each contributor, thanking him for his contribution, explaining to him why his idea could not be used and encouraging him to further effort. In this way a man was rewarded according to the value of his suggestion. The cash payment is the best incentive.

—C. L. Anderson, *Methods Engineer.*

That the number of firms employing some method of reward for suggestions is growing is due directly to the realization by management that well meant efforts on its part will secure ideas valuable in the conduct of the business. Such efforts also arouse greater interest on the part of the men and secure a fuller measure of co-operation.

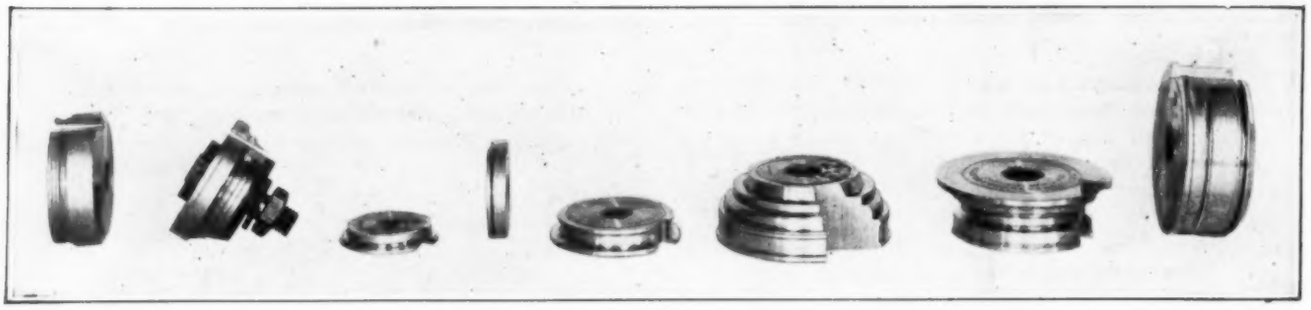
In order to secure the benefit of the ideas and brain work of the employees, it is necessary, especially in the early stages, for the management to sell the plan persistently. It is not sufficient to put up a suggestion box and invite the working force to make use of it. A thorough system must be created which will supply an incentive and stimulate workers to submit ideas for betterment. To obtain the complete confidence of the workers, those to whom the suggestions are submitted for approval must exercise reasonableness and be prompt in reporting and rewarding suggestions.

—John Kollarik.

What Is Overhead?

Comparing overhead on the basis of wages between two plants is about the worst example of poor judgment that I know. From his own experience Mr. Williams might be right in thinking that overhead should not exceed more than 150 per cent of the direct wages. Unless he knows that the other man was including exactly the same things in his direct wages, comparison could not have been made fairly. Mr. Williams might charge the cost of dressing his castings individually against each casting made, while his competitor might include dressing as part of his overhead. This would give the latter a lower direct wage charge and a higher overhead percentage. Overhead percentages based on wages are bugbears. The new viewpoint advocated by Mr. Berger is badly needed.

—T. H. Hargrave, *England.*



The Form Grinding of Circular Form-Tools

By Ellsworth Sheldon

Wheels are re-dressed for the finishing cuts—Dressing a wheel to grind a sharp corner—Gashing the tools in the same machine—Grinding straight forming tools

ALTHOUGH the operations considered in the two articles that immediately precede this one, are first, or roughing, cuts, the mathematics and mechanics of shaping the wheels and applying them to the work to locate and size the several surfaces of a contour, do not differ from those employed to finish the tool. The main difference between roughing and finishing is that finer-grained wheels, and sometimes wheels of harder grade, are selected for the work. The second grinding is conducted in the same manner as the first one, grinding all diameters and facing all shoulders to their finished dimensions with one wheel and at one setting, as far as is possible to do so. Planning the sequence before making the first move often enables the operator to accomplish with a minimum number of wheel changes and dressings, a job that would otherwise require a much longer time. The actual time of grinding is often but a fraction of the total time consumed, hence the operator's ability to visualize beforehand the several steps necessary to complete a given job is an important asset.

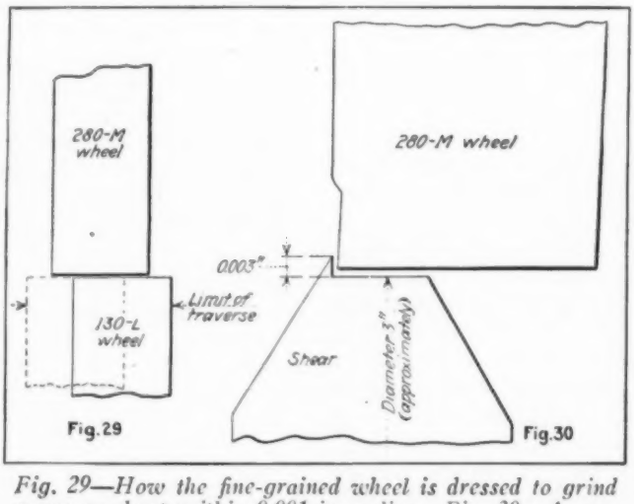


Fig. 29—How the fine-grained wheel is dressed to grind a corner sharp within 0.001-in. radius. Fig. 30—An example of contour grinding in which a sharp corner is absolutely necessary. A 280-M wheel was used

Final shaping of wheels is done with sharp, finely-pointed diamonds, held in the special holders previously described. Properly to conserve them they should be applied only to the light finishing cuts necessary to produce with accuracy the shapes required upon the wheels. A hand diamond, with which to smooth the periphery of a newly mounted wheel, to rough out curves and fillets, break down corners preparatory to rounding them, and, particularly, to remove a previously dressed shape and prepare the wheel to receive the next one, is a virtual necessity. Small blocks of carborundum, which may be obtained for the special purpose, or broken from a worn-out wheel, assist in conserving diamonds, as with them a wheel may be dressed roughly to any ordinary shape before even the hand diamond is applied. One of these blocks, held lightly for an instant in contact with the smoothly dressed grinding surface of the wheel, will often sharpen that surface without seriously deranging its shape, and thus enable the operator to finish a cut or series of cuts that otherwise would necessitate removing the work from the centers and putting in the diamond holder. With the above means of dressing the wheels judiciously applied, the work of the small diamonds is minimized. Add to this the proper application of the diamonds to their legitimate work, and the wear upon them becomes negligible. Final dressing should never be forced, both for the sake of the diamonds and of the wheels themselves. Where sharp external corners are involved, the final cuts should be made toward, rather than away from, the middle of the contour and thus avoid the tendency to break small

The sixth and concluding article.

particles of abrasive and bond from the corner of the wheel. Very thin wheels, as those used to sink narrow channels in the solid metal of a tool body, must be dressed very carefully. Internal, right-angled corners on the contour of a tool are regularly ground sharp within a radius of 0.003 in., which is sharp enough for most purposes and sharper than could be assured by the older method of polishing the contour with abrasive cloth. A 150-L wheel dressed in the regular way with the diamonds can be depended upon to secure this result. When more cleanly-cut corners are absolutely necessary, they can be produced within a radius of less than 0.001 in. by using a very fine-grained wheel, dressed by a special method. For this purpose a 280-M wheel is placed on the spindle of the grinding machine and is dressed carefully on the periphery and active side with the fine diamond. A 150-L wheel, as wide as or wider than the 280-M wheel, is mounted on an arbor, placed on the work centers and its periphery is dressed with equal care. With the harder wheel running at normal grinding speed and the wheel on the work centers running at the highest speed of which the headstock is capable, the two wheels are brought gently into contact while traversing the table of the grinding machine constantly.

The sketch Fig. 29 shows the application. The traverse of the table must be limited to a range that does not allow the softer wheel to pass in either direction beyond the corners of the harder one, nor must the traversing movement of the table be allowed to cease while the wheels are in contact.

As an example of what may be accomplished in the way of a sharp corner by this method of dressing, the sketch, Fig. 30, is shown. This represents, greatly enlarged, the contour of a circular shear that was required to cut strips of copper 0.002 in. wide from a sheet of that metal 0.002 in. thick; in other words, wires of 0.002-in. square section. This shear runs with a plain mate that overlaps the cutting edge but 0.001 in., thus leaving a space between it and the parallel surface of the mate just equal to the thickness of the metal to be cut.

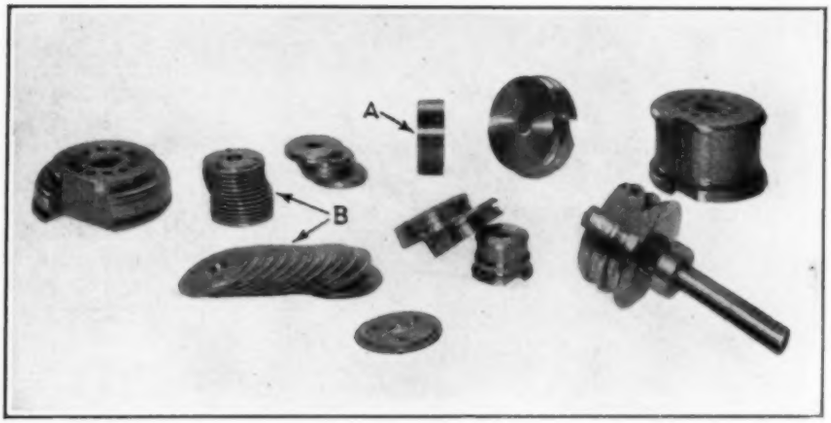


Fig. 31—Examples of circular form-tools, the contours of which are finished by grinding. Among them are tools built up of separate disks

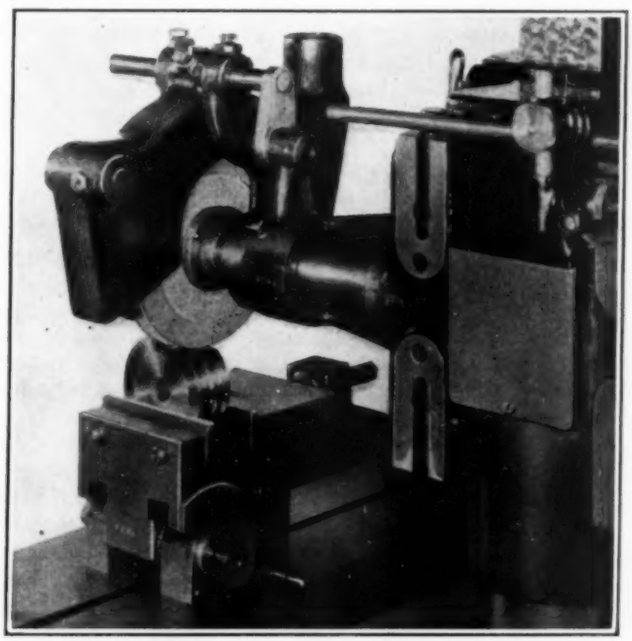
A slight clearance—less than 0.001 in.—is ground on the otherwise right-angled face of the shear by setting the wheelhead of the grinding machine to a slight angle. The fillet left by the corner of the grinding wheel must be less than the clearance, else the corner of the square-sectioned wire would be distorted. This shear was ground from a roughly shaped hardened blank of high-speed steel with a 280-M wheel, dressed as above described.

Curves and fillets may be blended very accurately with adjacent surfaces by observing the progress of the cut under the magnifying glass. There will be a pronounced difference in color between the new cut and the one made previously, especially if the work has been reversed on centers in the meantime. Curves and fillets of more than $\frac{1}{4}$-in. radius are generally ground with a 60-grain wheel of K or L grade; from $\frac{1}{4}$ to $\frac{1}{16}$ in. with a 100-grain; and less than $\frac{1}{16}$ in. radius with a 150-grain wheel.

In Fig. 31 may be seen a group of form tools that were picked up from the inspector's bench—not specially requisitioned from the stockroom or elsewhere for the purpose of photographing—hence they are representative of the work that is constantly passing through the department. The sample at *A* is a one-piece tool in which a series of identical channels have been ground in the hardened, unshaped body. At *B* may be seen a similar tool that was made by a different method.

In the latter case the tool is made up of disks that have been hardened and ground separately. As may be seen in the illustration, three holes have been jig-drilled in the disks before hardening them in order that they may be held rigidly in line by the special holder in which as many of the disks as may be needed to make up a tool of any desired width, are held in the screw machine.

It is imperative that the disks be ground accurately to thickness before the contours are ground. When there are enough of these tools to be made to warrant the special appliances necessary to hold them for grinding, it is less costly to make them in this way than to make each tool as a single piece, and a great advantage is gained from the possibility of immediate replacement in



Fiig. 32—Tools are gashed after the contours have been ground. This work may be done in the same machine by setting the wheelhead at 90 deg. and feeding the wheel vertically by means of the handwheel at the top of the upright

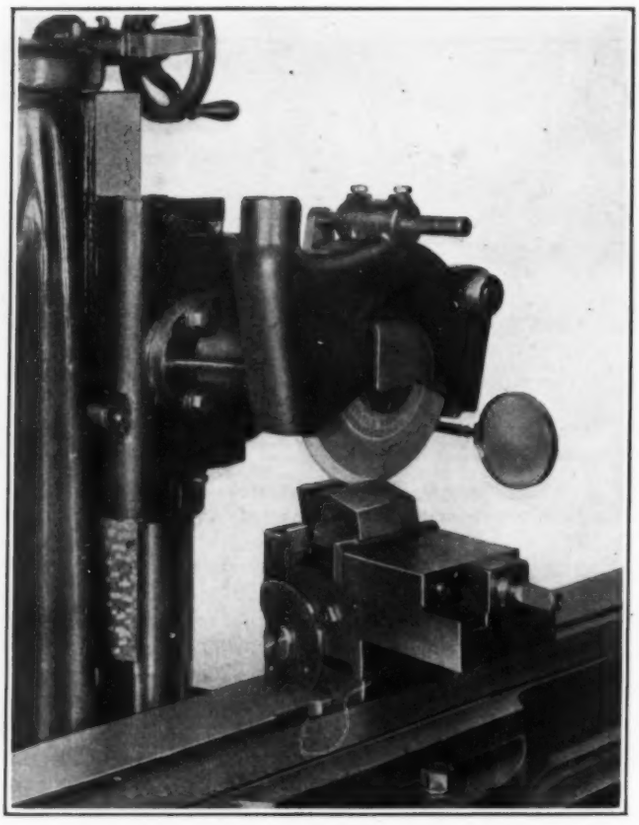


Fig. 33—Straight tools are ground on the contour by setting the wheelhead at 90 deg. and using the machine as a surface grinder. Wheels are formed by the same means as for circular tools. Power traverse is available

case of accidental breakage of any part of the contour by substituting as many of the disks as may be needed.

As a final test of the accuracy of a tool contour, it is magnified in a projectoscope to ten, twenty, or even fifty diameters, at which enlargement a thousandth approaches $\frac{1}{16}$ in. and errors are glaringly apparent. The grinding method of finishing contours is not claimed to be without error; it is merely more accurate than any other known method. It is also much faster than any method approaching it in accuracy, and it has the great advantage that errors discovered after the tool is put to work in a screw machine can be corrected without difficulty.

Minor changes found to be desirable after the first few pieces of work have been formed with the tool can be effected with equal ease, or a tool that has outlived its usefulness because of the obsolescence of the shape it produces, can be converted into a new tool of different shape with little trouble and at far less expense than would be involved in making a new tool, provided there is a reasonable degree of similarity between the old and the new shapes.

Circular form-tools are generally, though not necessarily, ground upon the contour before the gash is cut to develop the cutting edge. The main reason for this is that the sharp edges of the gash tend to break down the shaped wheel rapidly, and much more frequent dressing —wasteful alike of time and material—is required to keep them in order. There is always a slight amount of "spring" in the wheel, however lightly it is fed to the work, which causes it to jump when passing over the gap.

This springing of the wheel must be guarded against when grinding a diameter to size or facing a shoulder. The experienced operator soon learns to stop the feed at the right distance short of the mark to allow the cut to die out as the line is reached. Peripheral spring is fairly constant, but side spring varies inversely with the thickness of the wheel, hence great caution is necessary when using especially thin wheels on facing cuts.

The gash may be cut in circular form-tools by the same machine that does the contour grinding, by turning the wheelhead to 90 deg., securing the tool in a vise, or by other means, and traversing the table by power while feeding the wheel straight down upon the work by means of the small handwheel at the top of the upright. The view of the machine in Fig. 32 shows it from the rear, looking across the table toward the operator's position. The gashing can be done in any standard surface grinder, thus avoiding the necessity for tying up a more expensive machine.

Notwithstanding the preponderance of circular form-tools in screw machine work, there are still many "straight" tools used; some with dovetailed shanks to be secured in special holders, others of high-speed steel or stellite welded to shanks of mild steel. The contours of such tools can be ground on this machine almost as readily as are those of the circular tools. The vise having a vertical swivel, to be seen in Fig. 33, is a great convenience, as by its aid many angles can be ground on the tool with straight-faced wheels by merely tilting the work to the desired angle as indicated by the protractor of the vise.

The wheels are shaped for grinding straight tools in exactly the same way and by the same means as for grinding circular tools, except that any wheel may be dressed straight on the periphery by holding the diamond in the vise instead of swinging the wheelhead back to zero and putting on the regular diamond holder.

The wheelhead is always set at 90 deg. to apply the wheels to the work. The micrometer graduation on the rim of the small handwheel at the top of the upright takes the place of the micrometer dial of the cross-feed screw, and, like it, reads in thousandths upon the work—which reading is now, of course, coincident with the actual advance of the wheel. The micrometer dial by which advance of the wheel is indicated when grinding circular tools, now becomes the means of measuring widths, and its reading must be doubled when calculating the width of a shoulder or surface on the tool.

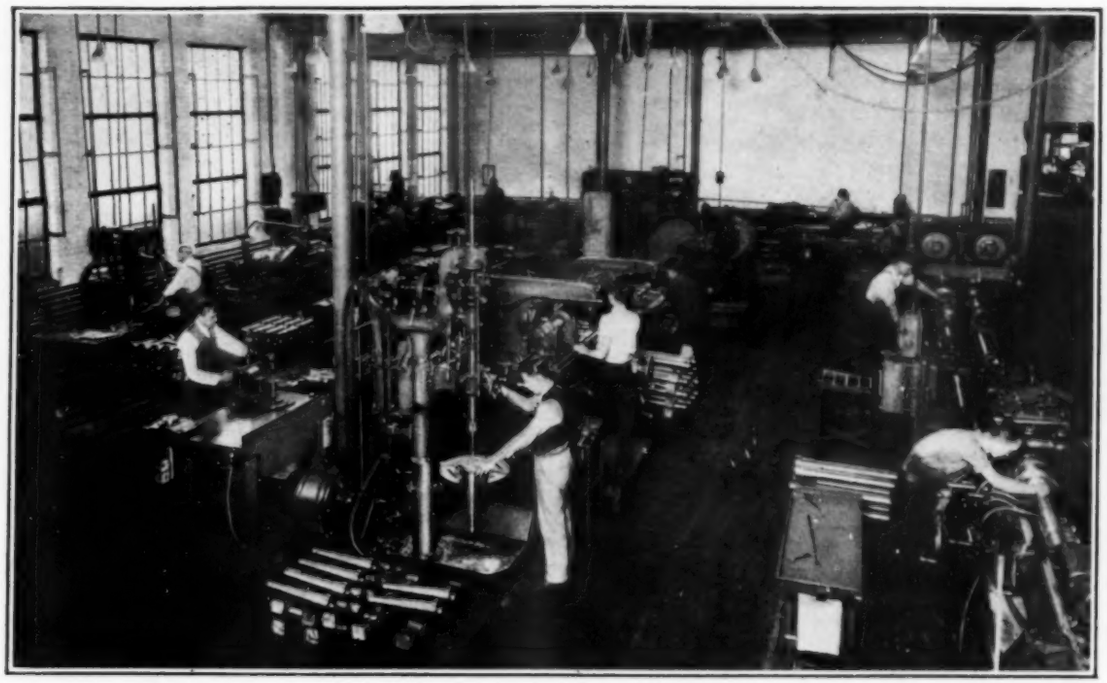
The vernier scale and the dial indicator to measure longitudinal movements of the table are no longer necessary, as traverse movements do not need to be measured.

Air Travel Abroad

GERMANY has 76 regular air lines controlled by one company. At least one plane a day is flown on each line, connecting about 81 towns in Germany. Subsidies of about 70 per cent of the total cost are granted for carrying the mail. Only two lines are lighted for regular night flying.

Air travel in Holland doubled in 1927, nearly 13,000 passengers, more than 41,000 lb. of mail and over 920,000 lb. of merchandise being carried. Italy operated 7 routes in 1927, by which nearly 10,000 passengers, 15,000 lb. of mail, and over 300,000 lb. of merchandise were carried.

The curve of commercial airplane production in the United States has been steadily rising since the first of the year. If the rise continues constant, the production should be 6,200 for June and 7,200 for July.



Spindle department of the Cincinnati Milling Machine Company

From Forging to Finished Spindle

How spindles for Cincinnati milling machines are made

RENEWED interest is evident in regard to spindles since the makers of milling machines adopted standards for spindle ends and arbors. Because of increased cutting loads and further requirements of accuracy in product the spindle is more than ever the heart of the milling machine. Hence spindles are made of high-grade alloy steel, are heat-treated, and are machined to very close tolerances. The practice described here is that of the Cincinnati Milling Machine Company.

The entire spindle department, with the exception of normalizing and heat-treating equipment, is shown in the headpiece. By arranging the machines and inspection stands in four rows, and along the end wall, virtual straight line manufacture has been obtained. Individual motor drive has been adopted for the entire department. Both normalizing and heat-treating equipment are at the observer's end of the illustration, an arrangement that fits in with the line manufacture. From the normalizing furnaces, through which the forgings pass, as the first operation, the spindles are delivered to the lathe shown in the right foreground of the illustration. Following the operation on that machine they are passed down the right-hand line of machines to the wall, then to the lathe located against the wall, and back up the second row of machines. After leaving the drill press at the end of the second line there is a burring operation, performed in the fixture attached to the bench in the third row. Heat-treating follows, after which the spindles are again placed in the machine line and caused to travel down the third and back the fourth row of machines.

Boring is performed on a gun-boring machine. Boring the taper and finish-turning and facing the flange is an engine lathe job. Burring is a hand operation. Rough grinding is done on a cylindrical grinder; 0.005 in. is left for finish grinding.

The spindles are of chrome-nickel steel and are drop forged. Before being machined they are normalized in the electric furnace, being held in the cooling oven for five hours. The temperature is automatically controlled. About 3½ hours heating is necessary to obtain the temperature required.

Trays are used to support the spindles in the furnace and ovens, a loaded tray carrying from 30 to 40 spindles. The trays are charged into the furnace and ovens by means of the elevating crane shown in Fig. 1. This method of handling the spindles cuts down the total normalizing time, which is further reduced by 1½ to 2 hours due to the preheating.

Conservation of heat and short furnace time are effected by the two ovens shown to the right of the electric furnace, illustrated in Fig. 2. In application both ovens are occupied, a cooling load being contained in the lower oven, a heating load in the upper oven. There is, of course, a load in the furnace itself. Heat is transferred from the cooling load to the load being

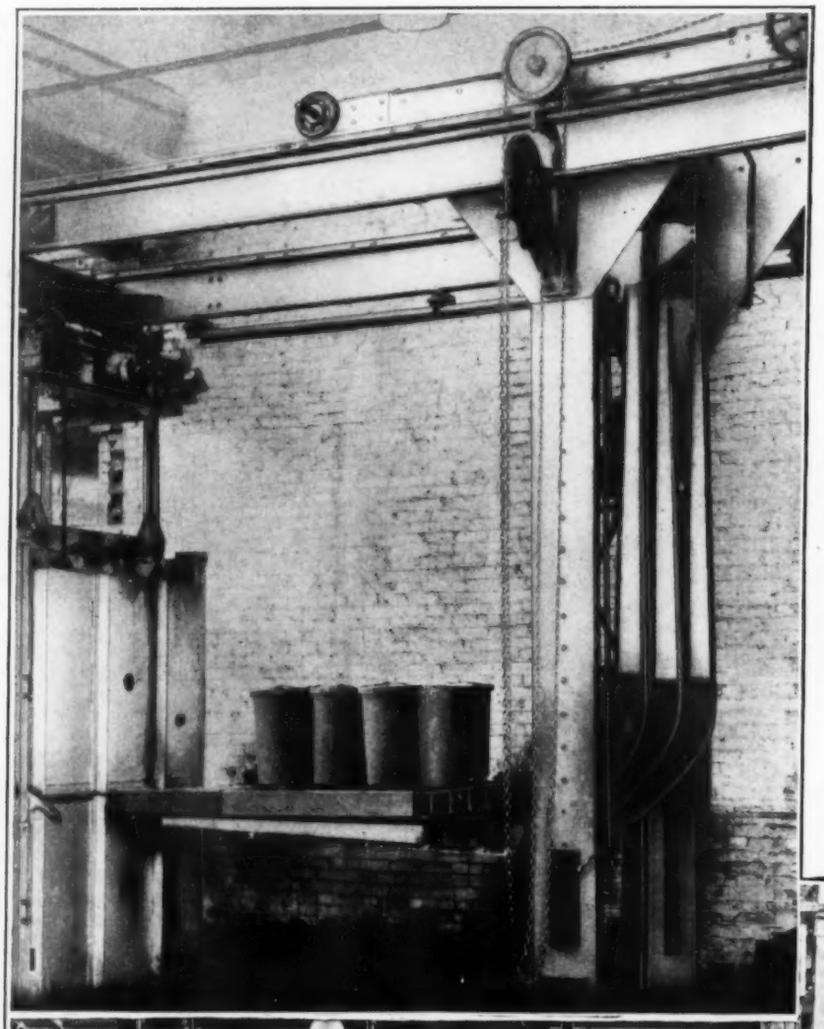
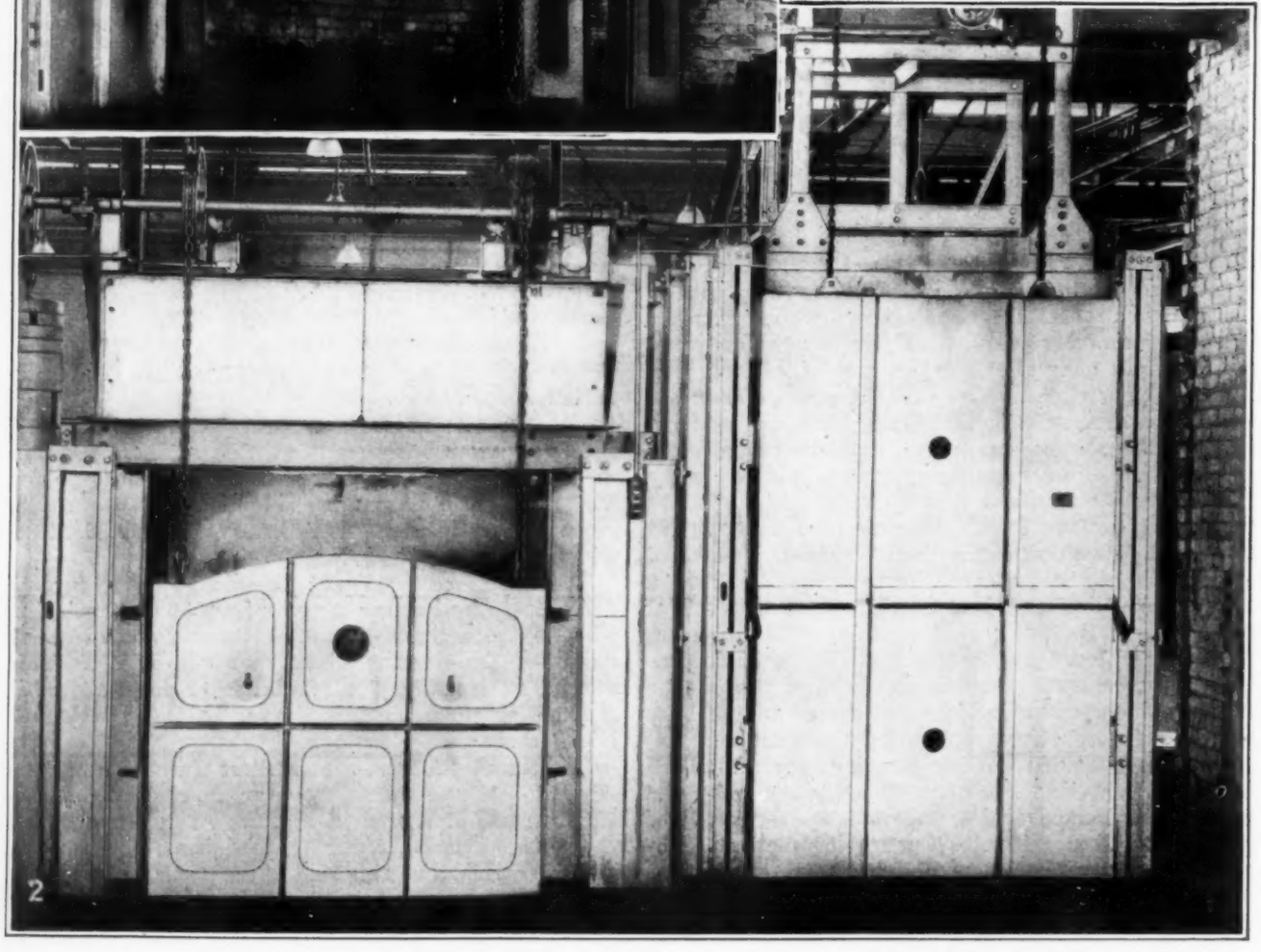


Fig. 1—Elevating crane used to charge furnace and ovens. The trays, one of which is shown, support from 30 to 40 spindles

Fig. 2 — Electric normalizing furnace with automatic temperature control. When a charge is drawn from the furnace to cool it is placed in the lower of the two ovens, shown at the right. In cooling, its heat will be transferred to the charge in the upper oven. Charges are transferred from the upper oven to the furnace



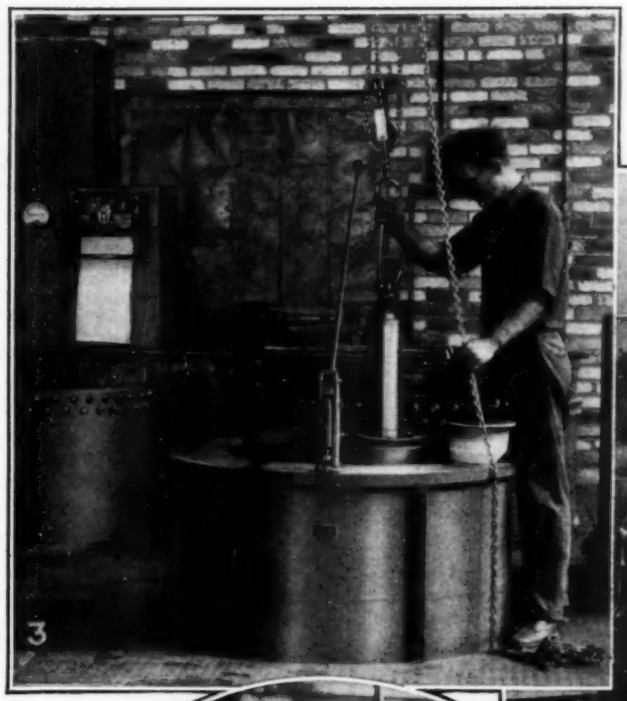
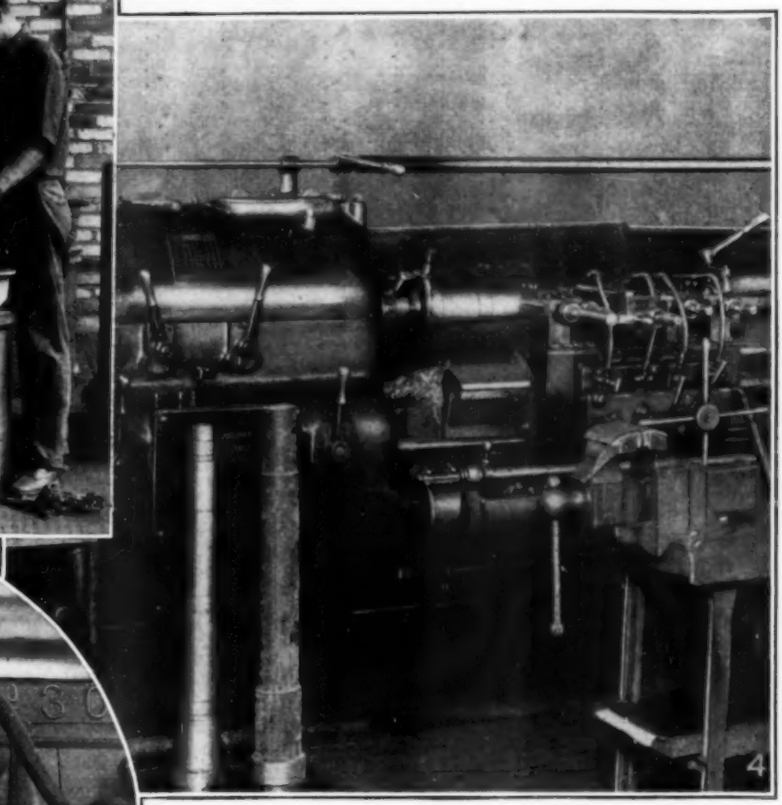


Fig. 3 — Automatically-controlled electric Hump furnace of 30-kw. capacity for hardening the spindles. The spindles are held vertically in the furnace, which is arranged with individual heat control for top and bottom



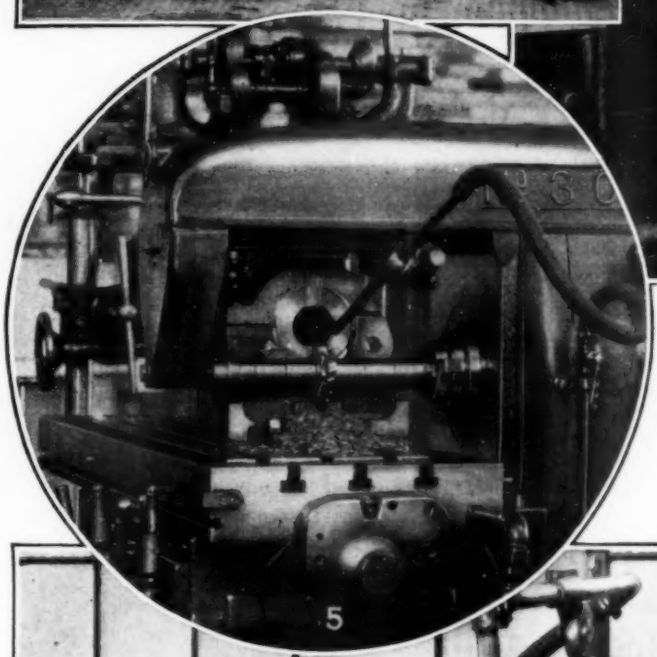
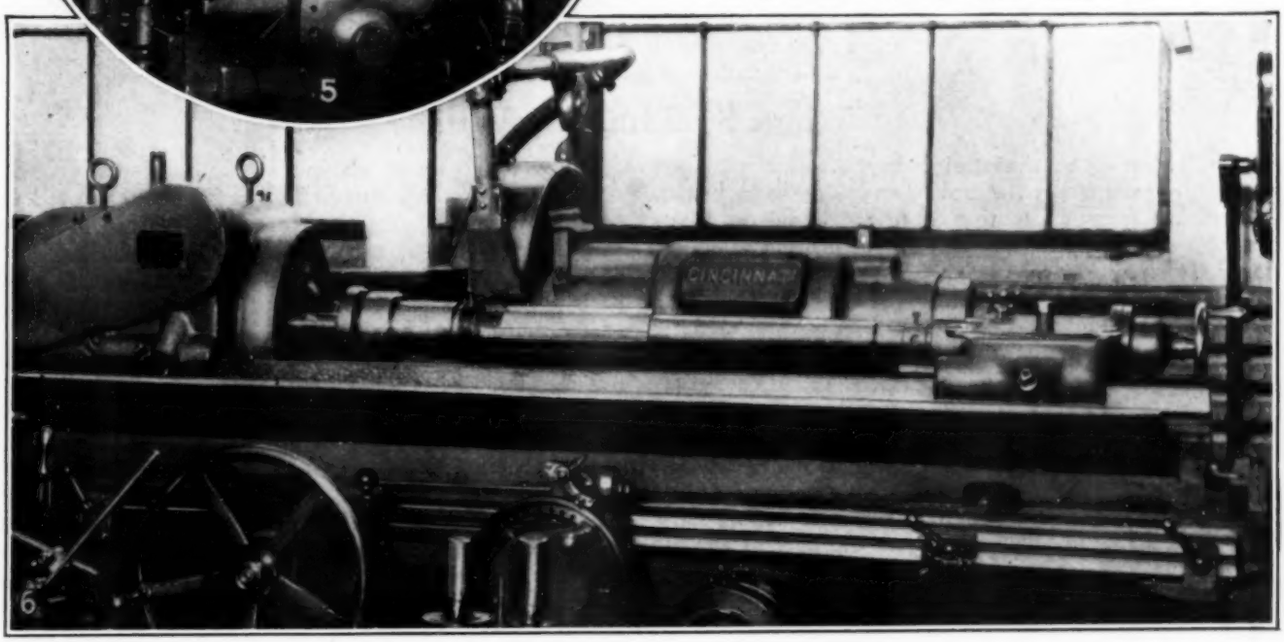


Fig. 4—Turning. The work is done in two settings, the straight turning in one, and the taper turning and necking in the other

Fig. 5—Milling the slots in flange. Interlocking cutters help maintain accuracy. Vertical feed of the machine is used

Fig. 6—The outside of the spindle is finish ground complete on the cylindrical grinder shown



preheated for the furnace. The sequence of charging, once a load has finished its stay in the furnace, is (a) to move the cooling load from the bottom oven to a position outside of the oven for the cooling to be finished in the air; (b) move the load from the furnace into the bottom oven; (c) move the load from the top oven into the furnace; (d) put a cold load into the top oven.

Heat-treating is accomplished in the 24-in. x 48-in. electric Hump furnaces of 30-kw. capacity shown in Fig. 3. The spindles are maintained in a vertical position in the furnace, which is arranged with individual, automatic heat control for top and bottom. The spindles are oil-quenched and then drawn back. In Fig. 4 the turning of the spindle, with the exception of the flange, is illustrated. Multiple tooling is used. Comparison of the forging and the spindle as machined in this operation, as shown at the left in the photograph, will show what reductions have been made. The work is done in two settings, the straight turning in one and the taper turning and necking in another. An average of ½ in. reduction in diameter is made and from 0.040 to 0.050 in. is left for grinding.

An important operation, milling the slots in the flange, is shown in Fig. 5. The type of fixture used is evident from the illustration. Interlocking cutters make possible maintaining accuracy. The vertical feed is used.

The outside of the spindle is finish ground complete on a cylindrical grinder as shown in Fig. 6. Finish grinding of the taper hole and face of flange, as performed in one setting on an internal grinder, are illustrated in Fig. 7. The vertical head is used in finishing the face of the flange and keyslot. Since the spindle is located in the fixture on finish-ground surfaces, the taper hole is bound to be concentric with the bearing surfaces; and the face of the flange, being finished in the same setting, must be at right angles to the axis of the spindle. Following final inspection the spindles are covered with a rust-preventing grease and are wrapped in waterproof paper. In that condition they are stored until issued for assembly. Throughout manufacture the spindles are carried on seperators that are piled on lift-truck platforms. This feature is illustrated in the headpiece. It facilitates moving from machine to machine and to and from the department, prevents scratching and is an aid to frequent inspection. The saving in labor due to this method of handling is considerable.

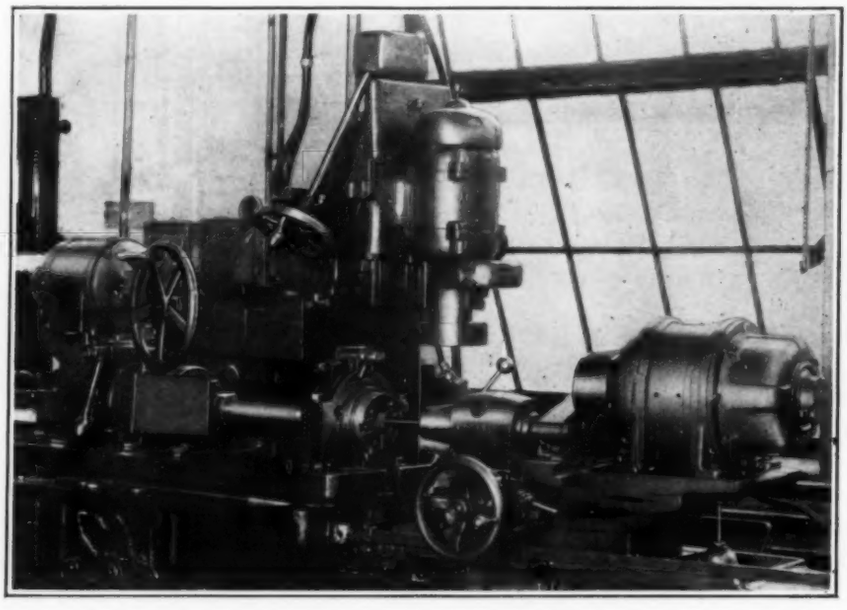


Fig. 7—Taper hole and face of flange are ground in one setting after outside of spindle is finished, to insure concentricity of taper hole with bearings, and squareness of face of flange with axis of spindle

Straight-line routing, segregation of the spindle activities in a separate department, and automatic control of heat-treating operations are considered to be important adjuncts to the production of uniform and accurate spindles. In line with the policies enumerated, that make of the spindle a part given individual treatment, is the policy of making one man responsible for both quality and delivery, a policy that is carried out with full measure of satisfaction.

Whose Steel Industry Is It?

PRICE cutting in the steel industry can be stopped only by casting out the craze for volume at any cost. This means scientific quoting of prices, based on actual cost plus a reasonable profit. It means sticking to quotations. It means going after only a reasonable proportion of the total business, based on the average business for previous years, and being satisfied with that volume. It means sticking to your own economic territory instead of trying to flood the country. After all, price-cutting really means swapping business, and does not add one ton to the total volume. With all the frantic price-cutting the actual proportion of business done by each company is probably not materially changed.

No industry can call its market its own. There must be a constant co-operative effort on the part of the industry to hold present markets and to develop new ones. A lack of that co-operative effort has resulted in the loss to the steel industry of the big roofing market in favor of such materials as asphalt. The automotive industry is another example. The automobile men had to fight hard to get the steel men to take their business, now one of the major steel markets.

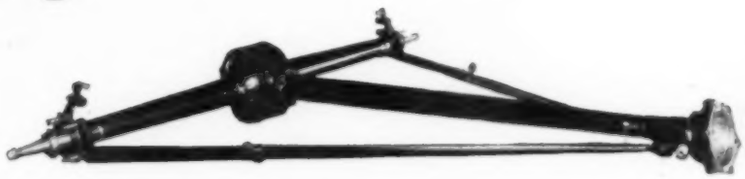
The two weapons in winning new markets and keeping old ones are research and education. To get the greatest value out of co-operative advertising it must be welded into a sound program with technical and economic research for the safeguarding and building up of old markets and the development of new ones. Recent advertising has graphically pictured the most horrible examples of the defects of steel—rusting, its cost, and its unsightliness. Such advertising leaves the reader with a growing feeling against all steel in general. If your steel is better, say so, but keep on saying that all steel is good.

Abstract of address delivered by O. H. Cheney, vice-president of the American Exchange Irving Trust Company, before the National Association of Flat Rolled Steel Manufacturers, White Sulphur Springs, June 5, 1928.

Equipment Makes Possible the Ford Model A

Machining and welding operations on the Rear Axle Housings

Assembly of the Rear Axle



By Fay Leone Faurote, M. E.

IT IS in the manufacture and assembly of the Ford rear axle that some of the most interesting Ford methods of metal fabrication are revealed. Hot metal spinning and electric welding are combined to produce a rear axle housing that is at once light and strong. As is shown in the accompanying illustrations, the rear-axle housing tube is blanked into wedge-shaped form from a large steel sheet, formed in three operations on a punch press, and is arc welded, longitudinally, at the rate of 50 an hr. It is then restruck to insure uniformity of size and shape, after which it is flash welded to the bell end-forgings at the rate of 60 per hour.

The first part of the article. The conclusion will appear in an early issue.

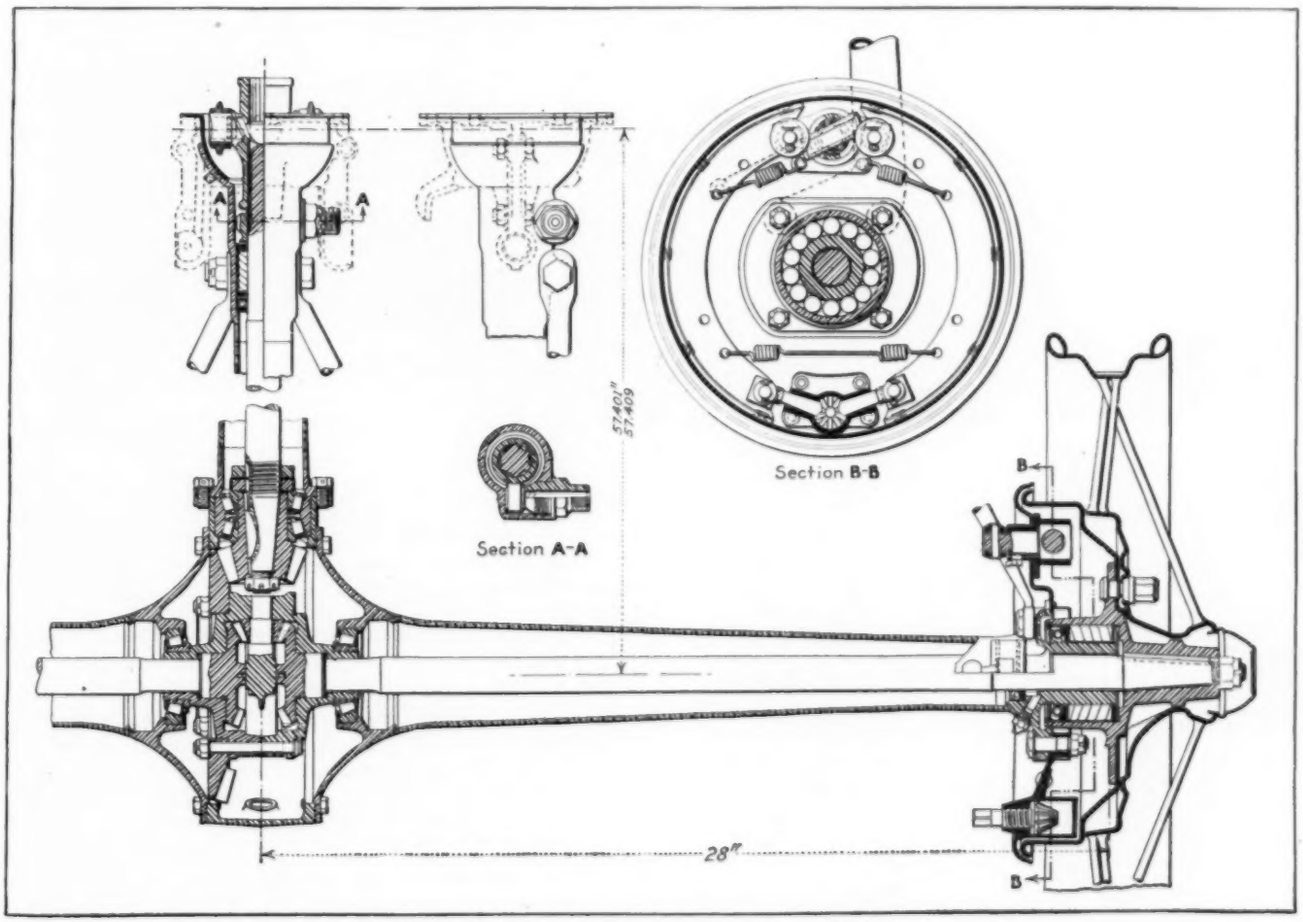


Fig. 1—Assembly of the rear axle and the drive shaft

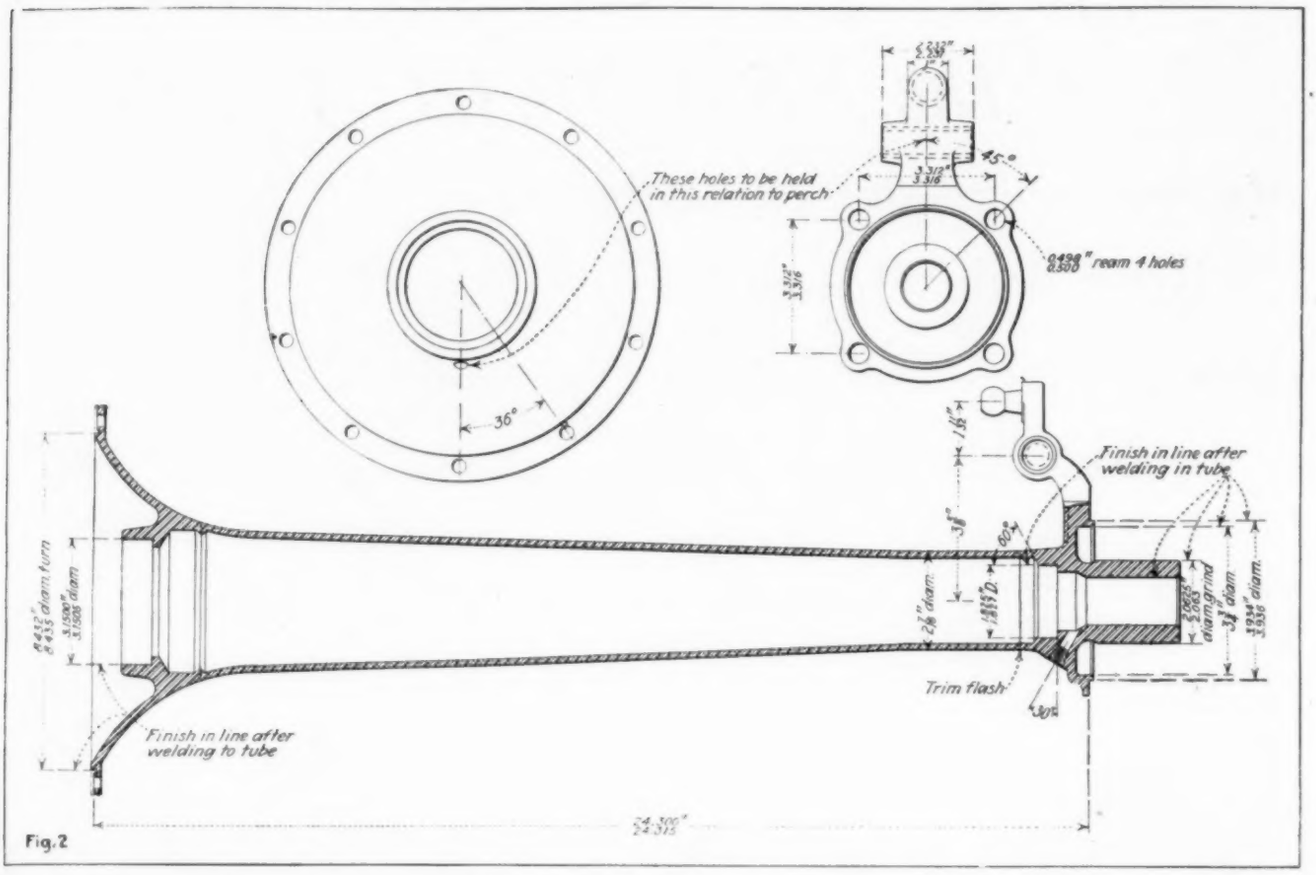


Fig. 2

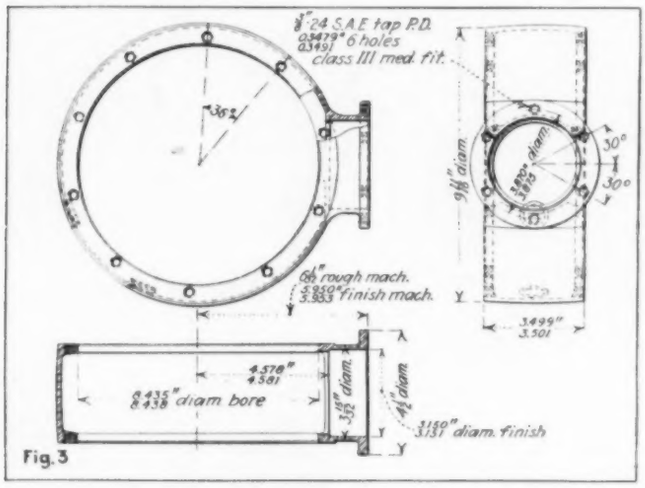


Fig. 3

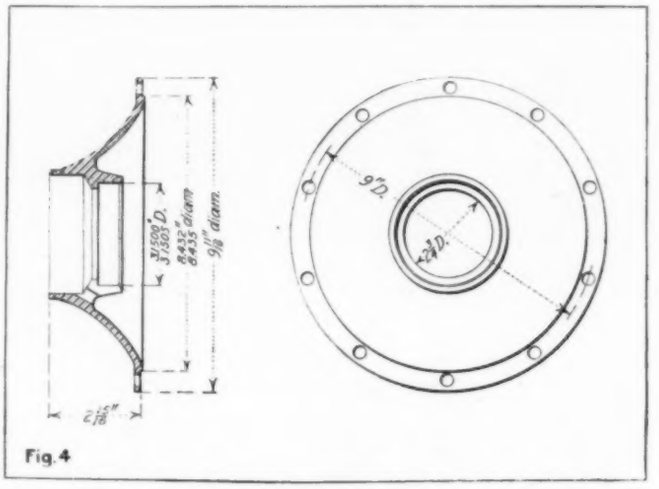


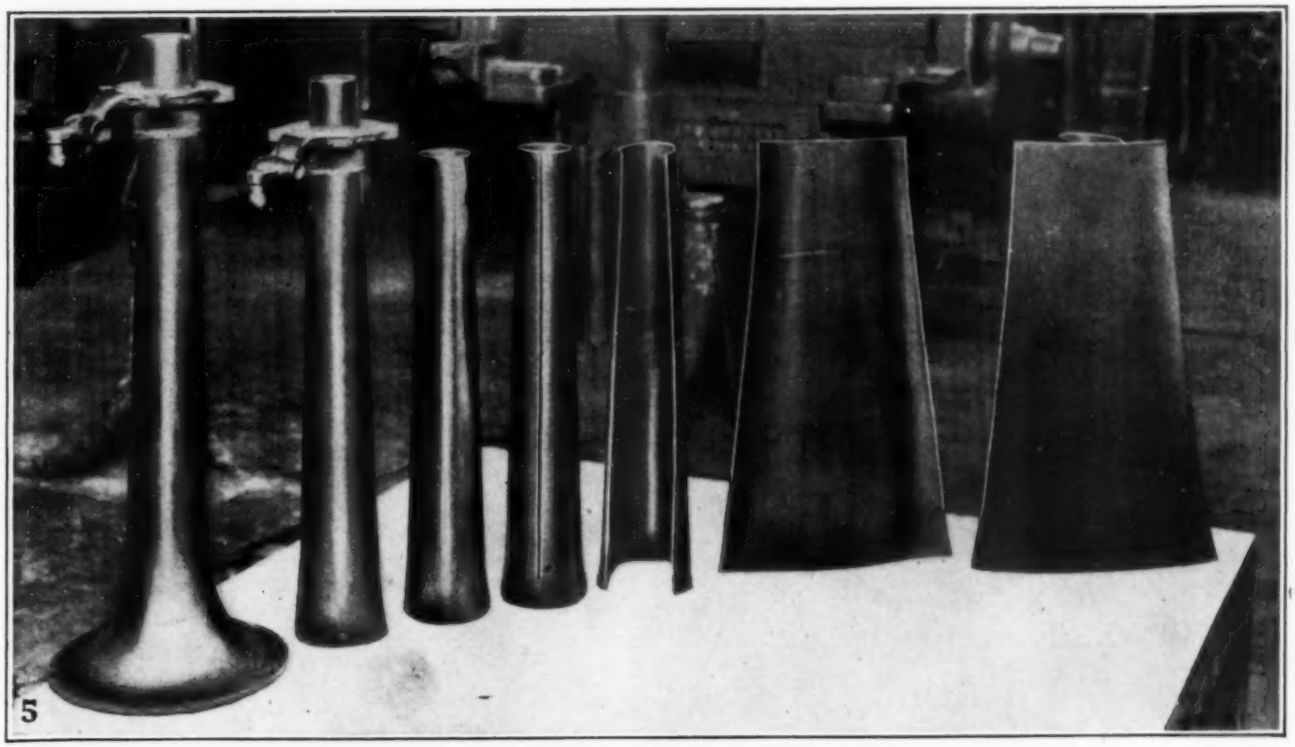
Fig. 4

Fig. 2—Rear axle-shaft housing. Fig. 3—Rear-axle differential housing. Fig. 4—Rear axle-shaft housing bell

The bell end-forgings are made by rolling, or spinning, blanks of hot steel between two formed rolls at enormous pressure and high speed, a procedure which forms a gracefully curved bell, uniform in thickness at no sacrifice in strength. The work is done in a special machine.

The central portion of the differential housing is formed from a piece of channel into about three-quarters of a circle, and is welded to the differential housing sleeve in an automatic welding machine designed by the Ford Motor Company for this operation.

In the older machine, used during the first few months of production, the channel ring was placed in a cradle and aligned, removable clamps were dropped into place and air was admitted into two cylinders that actuated the clamps and pulled the ring against the electrodes on each side. The operating handle was pushed back from the loading position to the open or starting position, the neck was slipped over an expanding collet, also an electrode, against a locater and aligner. A forked clamp was slipped into place and the air was turned on, expanding the collet. The operator then grasped the handle and threw a trigger switch, turning on the current. The arc was then drawn between the parts by backing off the handle enough so that the current jumped the gap. The operating handle



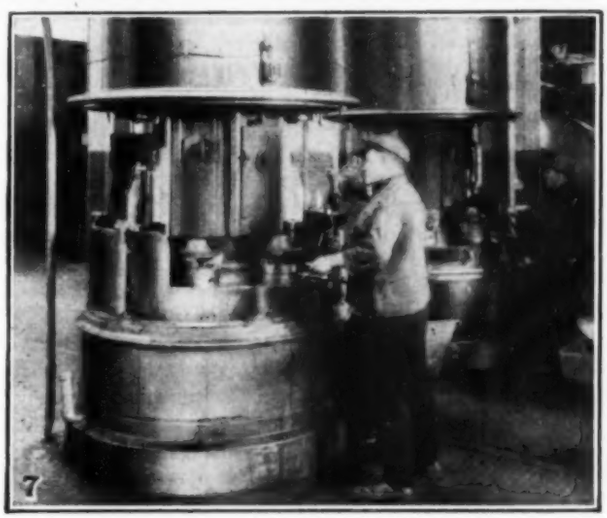


Fig. 5—Stages in production of the rear axle-shaft housing tubes. They are blanked from sheet steel 0.125 in. thick and rolled, shaped and electrically welded longitudinally. After a re-striking operation, they are flash welded to the bells

Fig. 6—The bells are hot rolled in this special machine. The blanks pass between two rolls under great pressure and at high speed

Fig. 7—After they have passed through the hot-rolling process, the bells are fully machined in this Bullard MultAu-Matic

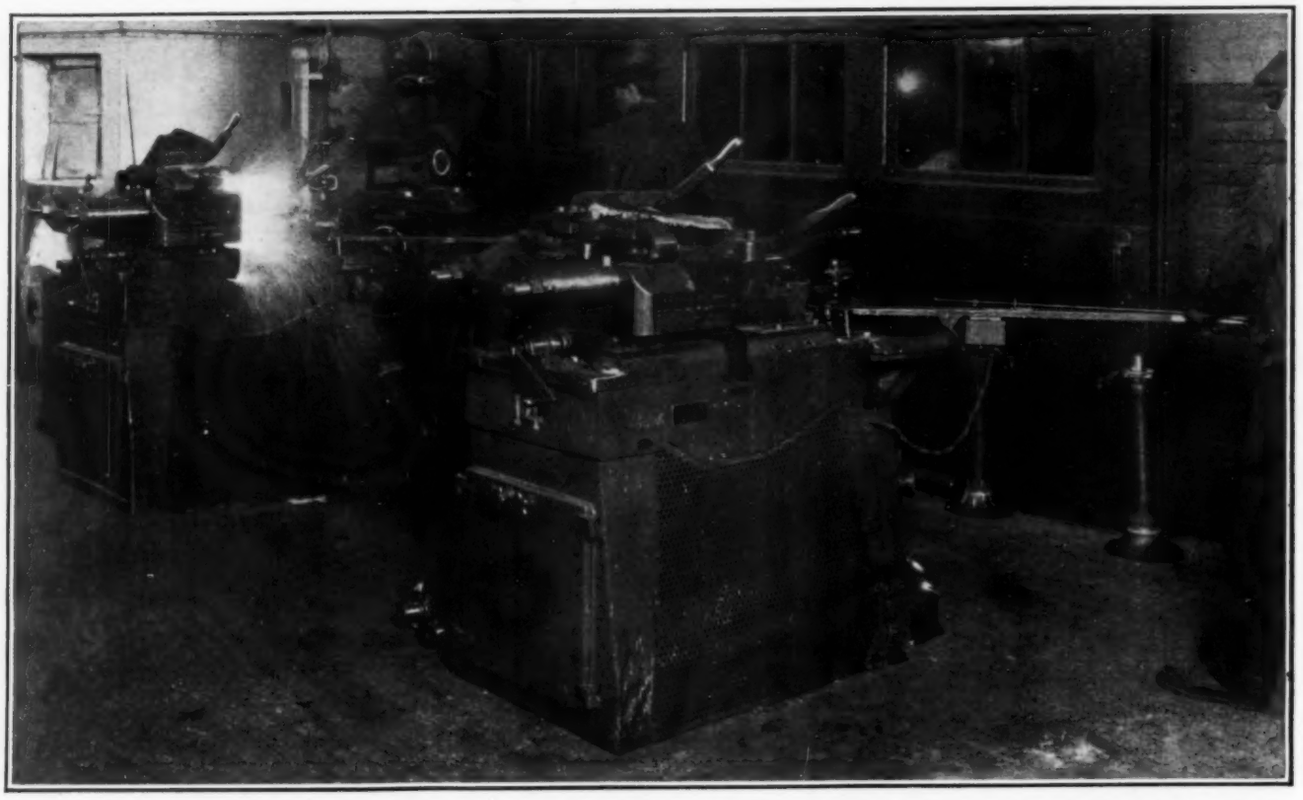


Fig. 8—The bells and the axle-housing tubes are joined together by flash welding in machines of this type. The welds must be strong because the parts sustain the greater portion of the weight of the car on the rear axle

was then brought up evenly and steadily to maintain the arc at a pre-determined point, the correct heat being the determining factor. After the weld took place, the air was released, the clamps removed, the operating handle pushed back to open position and the welded housing lifted out. Three men were necessary to operate each machine and the production ranged from 25 to 30 per hour.

Because of the difficulty in securing uniform results from this first method, Ford engineers decided that if an automatic welder could be designed that would largely eliminate the human equation and insure uniformity of pressure, contact, current flow and heat; whereby the parts would need only to be inserted, a trip operated and the finished work removed; the result would be worth the effort. The results achieved in the new machine have more than fulfilled their prophecy.

The new automatic welder welds on the same principle as the old machine, except that the two ring clamps are a part of the machine. One operator only is needed. His duties consist of placing the stock in the machine, slipping the U-shaped clamp on the collet end and turning the air valve which clamps all parts at once. When the machine is tripped, it goes through the entire welding cycle automatically. Finally the air valve is opened, the machine returns to its starting position, the finished welded housing is removed and the machine is ready to repeat its operation. The new machine will weld from 50 to 60 pieces per hr., and the welding is more uniform, because the human element has been removed from the actual welding cycle. Finally, the new machine occupies only 75 per cent of the floor space required for the former machine.

Fig. 9—The differential housings are formed from channel steel into rings of about three-quarters of a circle. The sleeves are welded to them in an automatic machine designed and built at the Ford plant

The housing weighs 8 lb., 12 oz., and the area of the weld is $2\frac{1}{16}$ sq.in. Incidentally, to show the strength of welded work, this housing crushes at 12 tons and fractures at 80 tons expansive force. All fractures occur outside of the weld. Ford welding engineers say that the full type automatic machine is claiming their closest attention, and that in the future all machines will incline to this type on account of its uniformity and speed.

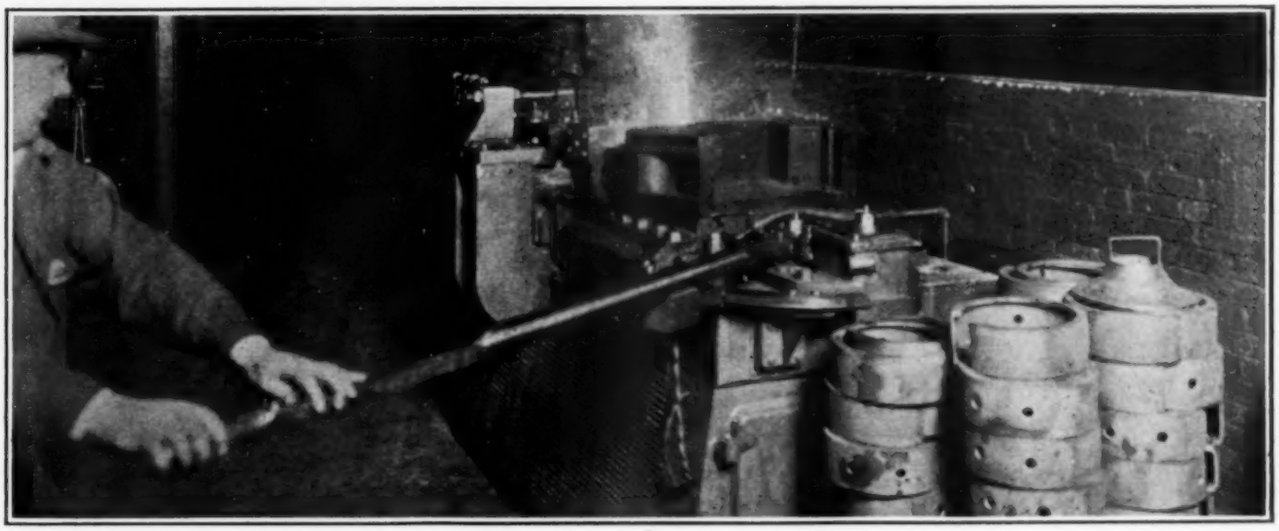


Fig. 10—When production was begun on the Ford Model A, the sleeves were welded to the differential housings in machines of this type. Three men were required to operate each machine, and the quality of the welds was variable

Furthermore, they say that Mr. Ford has held to this progressive production idea, as it moves in logical sequence from the rolling of the hot steel to the finished component without traveling many feet in the process.

Rear Axle Assembly Operation Sheet

No.	Operation	Machine	No. per Hour
1	Inspect one differential housing	Hand	...
2	Assemble one differential housing on drive-shaft assembly	Hand	...
3	Assemble six screws through differential-housing connection to drive-shaft assembly	Hand	...
4	Tighten six screws, and wire with one wire	Hand	...
5	Inspect two housings	Hand	...
6	Press Timken bearing cups into bore of housings	PAG-2 Ferracute press	400
7	Gage depth of ring	Hand	...
8	Assemble one housing gasket on each housing	Hand	...
9	Assemble one rear axle-shaft housing on right-hand side of differential housing	Hand	...
10	Assemble ten screws through rear axle-shaft housing bell-flange into differential housing, and tighten by hand	Hand	...
11	Assemble one differential assembly into differential housing and right-hand rear axle-shaft housing assembly	Hand	...
12	Assemble one rear axle-shaft housing on left-hand side of differential assembly	Hand	...
13	Assemble ten screws through rear axle-shaft housing-bell flange into differential housing, and tighten by hand	Hand	...
14	Assemble axle-shaft nuts	Hand operation	...
15	Hang drive shaft and differential-housing assembly on monorail assembly line	Hand	...

Fig. 11 — One of the automatic machines for welding sleeves to differential housings. The machines were designed and built at the Ford plant. Each machine is operated by one man

Rear Axle Assembly Operation Sheet (Cont.)

16	Inspect for gear strikes, high teeth on gears and tight gears	Hand operation	...
17	Assemble radius rod at axle	Hand operation	...
18	Assemble shipping cap	Hand	...
19	Assemble radius rod at drive shaft	Hand	...
20	Inspect— general		
21	Test axle for noisy gears		...
22	Wash complete assembly	Overhead conveyor through washing machine	...
23	Paint one coat oxide primer		...
24	Dry for 20 minutes		

· THE · FOREMAN'S · ROUND · TABLE ·

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions at the foot of the page have been prepared

Paying More to Save Money

"WHAT'S the big idea of all the figures, Al? Going to take a college examination, or something?" broke out Foreman Ed as they sat together in the shop lunch room.

"No," answered the other, as he folded up his note book. "But I think I've gotten hold of one of the most interesting propositions I've struck in the shop in a long time.

"You remember all those small steel parts on that computing machine that the old man took in on contract. Well, they sent me a host of orders for them to be made up in my department. Mostly screw machine work—knobs, levers, knurled nuts, and such doo-dads.

"We started off the job on the two screw machines this morning, and Jones, the automatic man, came to me and said that he would speed up the job and turn out several times the production if I would let him use brass instead of steel."

"But why didn't he suggest gold, Al? Brass costs some real money."

"Yes, Ed, brass rod costs a lot more per pound than the steel. I just got the prices on the way over here, and I'm all excited because we can save a slew of money and probably save buying another machine, if they will let me go ahead with the brass."

"I don't get you at all, Al. How do you save money by putting in a costly metal?"

"Here it is, Ed. With free-cutting brass rod Jones promises five times the hourly production. I figure that he can even beat that. Take this sleeve spacer where we get a production of 15 an hour in steel. We can speed up to 105 in brass. The material cost per hundred of the steel pieces is only 79 cents, while the material cost for the brass is $2.42. But the labor cost for the hundred steel pieces is $1.67 as against 24 cents labor cost on brass. Figuring machine time worth $1.00 an hour we actually save more than five dollars a hundred on the brass spacers, Ed, and we've got a better product."

"How a better product?"

"Don't you see that none of these parts carry any excessive loads or strains? Brass will work just as well as steel. Then, you know that brass takes a better nickel finish than steel—it will not be necessary to copperplate it first like they do with the steel. The brass fittings ought to be a sales argument, too—they will stand up against corrosion better than steel."

"Rave on, Al, you enthusiast!"

"That's not all the saving, Ed. Our tool cost will be smaller when cutting brass, and don't forget, too, that we don't have to buy an extra machine to get out the production with brass."

"I give in, Al. It looks good to me. But I wonder if you can get it across when you go up against those pen pushers in the engineering department."

Should the foreman interfere with a product already designed? Who specifies the materials that go into the product? Is first cost an important item, or is shop expense the big thing in specifications?

All foremen are urged to discuss these questions vital to their work; of course the

discussion is not limited to foremen. Letters accepted and published will be paid for

Discussion of Earlier Topics

Vacations as a Bonus

A MECHANICAL machine in the shop cannot run forever without being taken out of the production line for a general overhauling. So it is with the human machine. A vacation is not merely a rest, it is developing and storing up mental and physical energy for the production year to come. The investment in a vacation for the human machine will pay handsome dividends on the production work that follows, just as a similar investment pays on the overhauling of the mechanical machine. —FRANK M. TUOHY.

GIVING vacations, or the additions of extra days to a specified vacation period, as attendance bonuses helps to insure that any production program which is mapped out will not be hindered by lack of personnel to carry it through. Vacations as a bonus for promptness result almost uniformly in prompt attendance throughout the factory. It serves to bring in the workers on time every working day and also decreases the days out. —A. DAVIDSON.

EXPERIENCE has proven that employees do not care much for welfare work, but do appreciate the granting of a vacation. The worker should be given a vacation as a bonus according to the length of his service with the company.

The granting of a vacation drives home to every worker the idea that he is a member of a team, and that it takes continuous and uninterrupted teamwork to win. Giving a bonus for service will impress the worker that continuous service with the company is appreciated. It is a good way to insure decreased labor turnover.

—J. GURWITCH.

Monthly Checks on Workmen's Ability

I CANNOT help but line up with Ed in opposing a monthly check on the workman's ability. To begin with, any mechanical system of personnel control reflects a lack of faith in the judgment and ability of the foreman to evaluate his men when a question of discharge or layoff is concerned. It is always possible that such information will leak out, and that the lower rated men will want to argue the point. Even if they lack the courage to approach the foreman they will discuss the matter among themselves. Another danger is that certain individuals will be given the same standardized routine mark so that the system will lose its effectiveness. On the other hand, if a man's rating fluctuates greatly, the foreman is bound to be called in by a higher executive to give an explanation.

If the ratings are to be based on a man's efficiency, more difficulties would be encountered. Estimates of efficiency with regard to production would also provoke arguments. Furthermore, it is necessary to have a clerk to keep the record. The best men, being given highly intricate development jobs, will show a less satisfactory percentage than the poorest with their simple routine jobs. There will always be some men who will cease to work for the company's best interest and work for marks instead. If you doubt this, consult any foreman who has such a system to carry out. —J. F. CONNOR.

THE · NEXT · TOPIC

Keeping a Machine Busy

ADVANCE QUESTION

In a test between two radial drills one saves 3 minutes on a 10-minute job. Ed wants to throw out the old machine. Al wants to know how much work there is for it to do before he decides. Which is right?

Training the Foreman in Management

MY OPINION is that the management of every firm should teach its foremen the policy and system they are to use in the shop. In most cases today a foreman can only learn the policy of his employers by getting bits of information when discussing problems with the higher executives. These he must piece together as best he can. Unless he can do this with a high degree of accuracy, he does not hold his position long.

The foreman of today is the higher executive of tomorrow. One hour spent per day in a study of the actual facts relative to his firm's policy will increase his efficiency and prevent a scarcity of executives with outstanding ability such as is the case today.

—C. L. HENRY, *England.*

He Never Asks for a Raise

IT WAS up to Bill Hankin's foreman to see to it that he was given something more than the average for his better work.

There are many ways for a foreman to find out whether his men are satisfied without suggesting a raise. His daily contacts should keep him posted on the financial conditions of his men, the peculiar qualities of their character, and the good example they are setting for the others. The high cost of living and the keen competition

of other concerns always ready to pick up a good man, should spur him to study his men carefully, trying to get for them what is right.

A foreman who knows the real value of his men is worthy of the best consideration on the part of the management because he has gone a long way in preserving to the concern he works for an undeniable source of profit and moral satisfaction. —L. C. FRACCHIA, *Italy.*

Getting the Wear Out of Machines

IF THE machines in our shops will not conform to present day production requirements, then the sooner they wear out the better. However, if the present-day machine tools are examined carefully, it will be realized that they will stand the strains imposed today with a minimum amount of wear, and that they will not depreciate more rapidly than the machines of ten or fifteen years ago. Furthermore, with proper attention to adjustments and with a good operator on the machine, heavy cuts at high speeds may be used.

—F. E. BIRD, *Canada.*

MACHINE tools, if proper care is exercised, will last a lifetime. But every year improvements are made to increase production. A machine designed five years ago would in all probability do much less work in a given time than the machines designed today. So what good is the older machine if a new machine can be had that will pay for itself in a shorter time? Altogether, I think Al had the right idea in that machines should be worn out as fast as is reasonably possible. —W. C. BOSTON.

Should He Report Another's Error?

WOULDN'T it have been simpler to have returned the air motor "unofficially" in the first place? As soon as it was found, it could have been deposited within the limits of its own department, there to be found and probably absorbed without much ado or danger of lost jobs.

Firing a man always did seem to me a weak sort of way of solving a problem by eliminating it—only to replace it with another unknown one in the form of a new man. Very few single offenses warrant this drastic action. If Al could feel that the man, if discovered, would not be so harshly dealt with he would not be so concerned with the effect of his discovery.

—GEO. W. STEDMAN.

IT IS a poor foreman who gives his men cause to be afraid to come out in the open with errors. Men are frequently forced by circumstances to bury their consciences for fear of losing the jobs on which wives and children are dependent. There are times when you can't blame the man who uses questionable methods to insure his safety against superiors who are too "thick" to see the wisdom of making such methods unnecessary.

Not knowing the man I should play safe and hold my tongue. There are cases, of course, so serious that they cannot be overlooked, and there are men who are entirely devoid of interest in their jobs and in their employers. And yet it pays to give a man the benefit of any doubt that exists. —ARTHUR K. BURDITT.

Helping the Firm Make Sales

A FRIEND of mine working on the road for a certain firm was quite lucky along the line of making sales. So much so, in fact, that when commission was refused him he decided to work as a salesman. When given the opportunity he was a complete failure. The reason for his former success was that when working at his regular work of repairing and setting up machinery he tried to get the owners or other officials interested in his firm's products, or suggested a change for better equipment. Being a good man he was able to answer any questions to their satisfaction. Working from the outside he did not have this chance, and failed accordingly.

—FRANK H. WALGENBACH, *Foreman.*

TO THOSE who have to deal with the general run of salesmen day in and day out, it is sometimes a distinct relief to be able to get down to brass tacks and discuss equipment with a man who actually installs and operates it. He will answer detailed questions with a directness that is refreshing. So, since Roberts did make the sale, I suspect that is the way the manager of the neighboring mine felt. Probably, to have called in a salesman would have been a distinct mistake.

—PHILIP H. HOELZLE.

Making the New Planers Pay

AFTER all, the average sensible workman is human and has pride in himself and in his machine. For proof, I draw your attention to the pride a machinist takes in his automobile. So why not make him feel that the new machine is one of his greatest personal interests, making him feel that he is not just a mere cog in a chain of gears, but that he is worthy to know a little of the shop's affairs? —J. PILLING.

Putting Color on the Machinery

SPECIALIZATION of work on a production basis has made man a part of the machinery, making him gloomy and slow in his mind, except through the desire to get the most money he can from his machine.

Sporting fields, picnics with his fellow workmen, help to celebrate Tony's holiday, club meetings, and other entertainments backed by the company, give the men an opportunity for brightening the daily struggle for life. Bright colors in the shop is one more point that helps to take out the monotony of the day's work, and tends to better production. —FAUSTO RECERRIL, *Mexico.*

THE appearance of a machine has a great deal to do with the amount of care it receives. Can you recall the attention you lavished on the car when it was new, and how proud you were of its shiny colored hood? Has it had such affectionate greasing, such careful cleaning since? Pride plays a very great part in the upkeep of machinery.

The principles of beauty must also be observed. The color used must be in good taste. The vivid red and brilliant yellow do not bring to machinery the care that might be expected if it were given more pleasing lines and more carefully selected colors. —E. F. NELSON.

Locomotive Shop Methods from the L. & N. R. R.

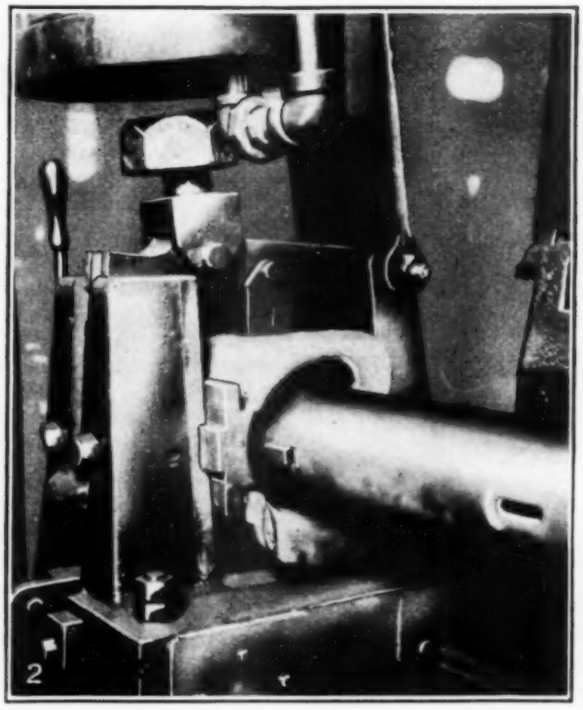
By Frank W. Curtis
Western Editor, American Machinist

A group of handy devices, including a die for threading grease plugs in a drill press, a trepanning tool for superheater flue sheets and a set-up for turning rod packing

AMONG the tools in use at the Louisville, Ky., shops of the Louisville & Nashville Railroad Company, is a device for threading cast-iron grease-cup plugs in a drill press. It consists of a diehead mounted on the machine table, as illustrated in Fig. 1. The plug to be threaded is placed on a bushing located in the crossmember attached to the diehead. The purpose of the bushing is merely to align the work with the die before the threading is started. With the plug in position, the driving shank fitted in the machine spindle is lowered until it engages the head of the grease plug, and then it is forced downward, causing the work to engage the threads of the die. After being threaded, the work falls into a tote box located under the machine table. A ring thread-gage for checking the finished thread is shown in front of the die. The threads are cut on the rough casting.

Air-operated clamps have been attached to the journal-brass boring machine in order to reduce the manual effort heretofore required to clamp the brasses in the fixture. One of four fixtures of different sizes is shown in Fig. 2. The air cylinder is positioned at the top of the fixture, and is arranged so that its piston rod operates the clamp to hold two brasses. The brasses are placed one above the other and are separated the right amount by spacing blocks on the sides of the fixtures. Blocks of different sizes can be interchanged with those shown, in order to separate brasses for different sizes of journals.

Holes in superheater flue-sheets are trepanned by the tool shown in Fig. 3. A feature of the device is the spring-operated pilot that keeps the tool central throughout the cut. The center-point on the end of the pilot fits into center-punch marks previously made in laying out the sheet and then the center recedes into the shank of the tool, progressively, as the cutting teeth pass into the work. Constructional details of the tool are illus-



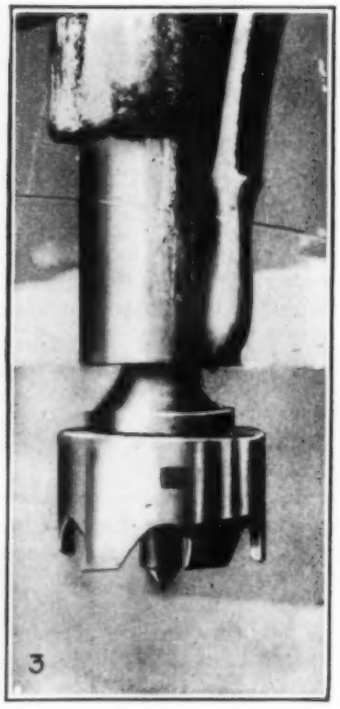


Fig. 1—Grease-cup plugs are threaded from the rough casting in a drill press equipped with a dichead mounted on the machine table. Fig. 2—The machine for boring car journal-brasses is equipped with air-operated clamps. The brasses are separated by spacing blocks. Fig. 3—For trepanning holes in superheater flue-sheets with this spring-piloted trepanning tool, it is not necessary to drill or punch the pilot holes

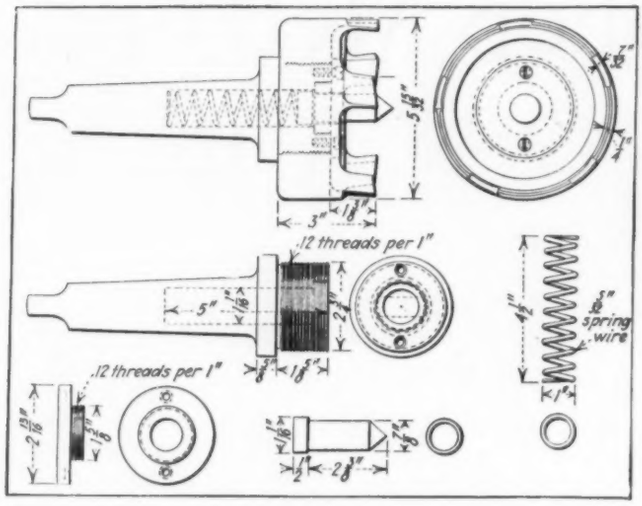


Fig. 4—Constructional details of the trepanning tool for superheater flue holes. The assembled cutter is shown at the top. The cutter head has five blades and is threaded to the shank. For different sizes of holes it is necessary only to apply different sizes of cutters

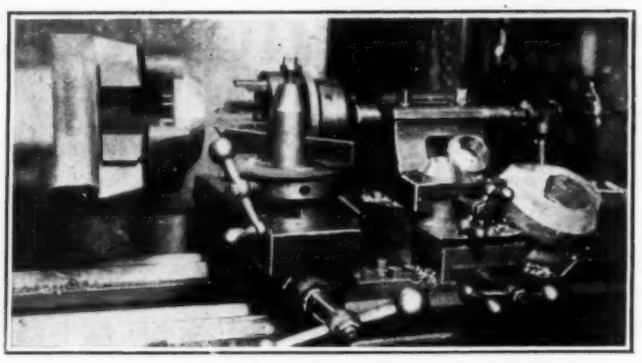


Fig. 5—Turning and facing rod packing in a lathe equipped with a two-jaw chuck and two tool slides. By changing the chuck jaws and cutter heads, packing for rods of different sizes can be accommodated

trated in Fig. 4, showing at the top an assembled view. The cutter body, held on the shank by a threaded section, has five teeth and can easily be interchanged with cutters suited for other sizes of flue-holes. Guiding the cutter by means of center-punch marks has eliminated the necessity of drilling or punching pilot holes in the flue sheet, as in the usual practice.

Rod-packing of various sizes is finish-turned and faced in a lathe equipped with a two-jaw chuck for holding the work by the large diameter, and two tool slides mounted on the carriage. The set-up is shown in Fig. 5, arranged for one of the larger sizes of packing, while some of the smaller units may be seen on the right-hand tool block. The cutter, arranged to face the 50-deg. angle, has four adjustable blades, which are interchangeable with other cutters to suit a variety of packing.

Efficiency and Unemployment—*Discussion*

By T. S. Catmur
London, England

I NOTICE in the European edition for April 21 an article headed "Efficiency and Unemployment" and in the next issue dated April 28 an article headed "Extent of Unemployment Is Not Serious."

For some months articles have been appearing in most of our papers over here generally headed "From our American Correspondent," in which it is inferred that America is becoming so mechanized that there is a danger. The two following paragraphs are a sample:

"Perhaps the most sinister fact in connection with unemployment is that almost daily some new process is invented or installed, designed to employ less labor, thus throwing men out of work.

"No expert pretends to foresee the results of this process. The whole future of American civilization may be involved."

Each paper has given the same future but in a different way.

Now we all know that there are certain interested parties who are prepared to distort facts to their own ends, and as there are those who would break down the trend of modern civilization, we ought to use care.

Unfortunately the United States Government does not maintain a census of unemployment and so there are no official figures to contradict the number of unemployed, but even so, most of us know that by the aid of machinery this world can carry its population in a much more enlightened manner, and that being so, we need not fear progressing still farther, as none of us would like to face giving up the use of machinery as it would throw us back to pre-historic days.

Even if we carried this displacement of labor by high production per man to a much greater rate than it is even now, civilization would still be better off. More who are now working would be able to live on investments or by other means than work, non-manufacturing pursuits would also absorb more labor because the cheaper a commodity the bigger the market, and as was pointed out by Dr. Julius Klein of the United States Bureau of Foreign and Domestic Commerce before a conference of executives of the chemical industry in Washington on February 16, although industry is producing far more, less people are employed, but that this does not mean general unemployment. The numbers engaged in automobile servicing and distribution had increased some 750,000. The new-born radio trade, exclusive of the manufacturing end had absorbed about 125,000; motion picture theaters and services exclusive of production about the same number, and hotels and restaurants probably over half a million. Other new developments have been aeronautics and flying, home electrical appliances, vacuum cleaners, domestic refrigeration.

The Hon. A. B. Houghton, American Ambassador to Great Britain, has stated that "20,000,000 industrial workers of America are doing roughly the work of 800,000,000 men without tools." This was given as an interesting fact and an indication of progress.

Surely we who are engaged in the machine tool business are not going to sit down while people for political reasons distort the facts for their own ends without any care of what is best for the community.

· BOOK · REVIEWS ·

FINANCIAL AND BUSINESS FORECASTING—The Basic Business Cycle Theses Explained, and the Art of Forecasting Discussed Without the Use of Higher Mathematics—By Dr. Warren F. Hickernell. Two volumes. Nine hundred and fourteen pages 5½x8½ in. Cloth. Published by the Alexander Hamilton Institute, New York City. Price for both volumes $10.

TO THE business man and manufacturing executive who wishes to possess a working knowledge of the basic theories of the business cycle minus perplexing mathematical formulae; a quick, vivid view of the waves of prosperity and of over-speculation, which have characterized the course of business in the United States and Europe for more than a century past; and finally the basic methods now in use in financial analysis and forecasting, this two-volume publication, by Doctor Hickernell, will prove most interesting and enlightening. The cyclic theories of Mills, Jevon, Moore, Juglar and Mitchell are explained in a simple manner, and their strength and weaknesses pointed out. Many business men believe that the business cycle, with all its attendant evils, is inevitable, and for which there is no positive cure. Although admitting that this belief has considerable foundation, based on the ups and downs of the past four centuries, yet the fact is made clear that there are cures for cycles of wide variation in business and industrial activities, and a smoothing of the business cycle is even now being applied. History is very generously used to explain the basic reasons for these decided fluctuations of the past.

The scholar may stop with an analysis of the causes and effects, but for the man in active business the question of how to apply theory to his own affairs assumes paramount importance. Doctor Hickernell accordingly devotes his second volume to a study of financial analysis and forecasting, bringing out the fact that the four symbols of forecasting are: (1) Basic business statistics; (2) a knowledge of economic principles; (3) perspective, based on a study of business history; (4) good judgment in applying principles to the interpretation of statistics. It is necessary to study individual commodities, individual securities, and local business conditions, as well as the general trend of business. In this connection it may be pointed out that the use of mathematical methods in making charts of general business was of greater benefit before the World War than it is now under the régimé of stabilized conditions, which has resulted from federal reserve control. Before the war industrial fluctuations went to extremes, and individual markets were importantly affected by the general trend. In recent years, however, economic conditions have been well stabilized, and the analysis of individual markets has become increasingly important.

CASUALTY INSURANCE. By C. A. Kulp. Six hundred and eight pages, 5¾x8½ in. Published by the Ronald Press Company, New York. Price $6.

CASUALTY insurance affects everyone, both as individuals and as members of business organizations, because it includes workmen's compensation, public liability, automobile, property damage, accident and health, burglary, plate glass, power plant, forgery, sprinkler leakage, and many other lines of insurance to cover industry.

The author is assistant professor of insurance at the Wharton School of Commerce and Finance at the University of Pennsylvania and is consequently familiar with the treatment of each type of casualty insurance. His treatment includes just the points the business man wants to know, such as the risk covered; the promises and exceptions made by the insuring companies; duties of the insured; rights and liabilities of all concerned; meaning of the co-insurance clause and other endorsements; and the way in which rates are determined and premiums calculated.

The volume is divided into four general sections under the headings of risk and insurance; third party insurance; property insurance; and insurance of accidents and health.

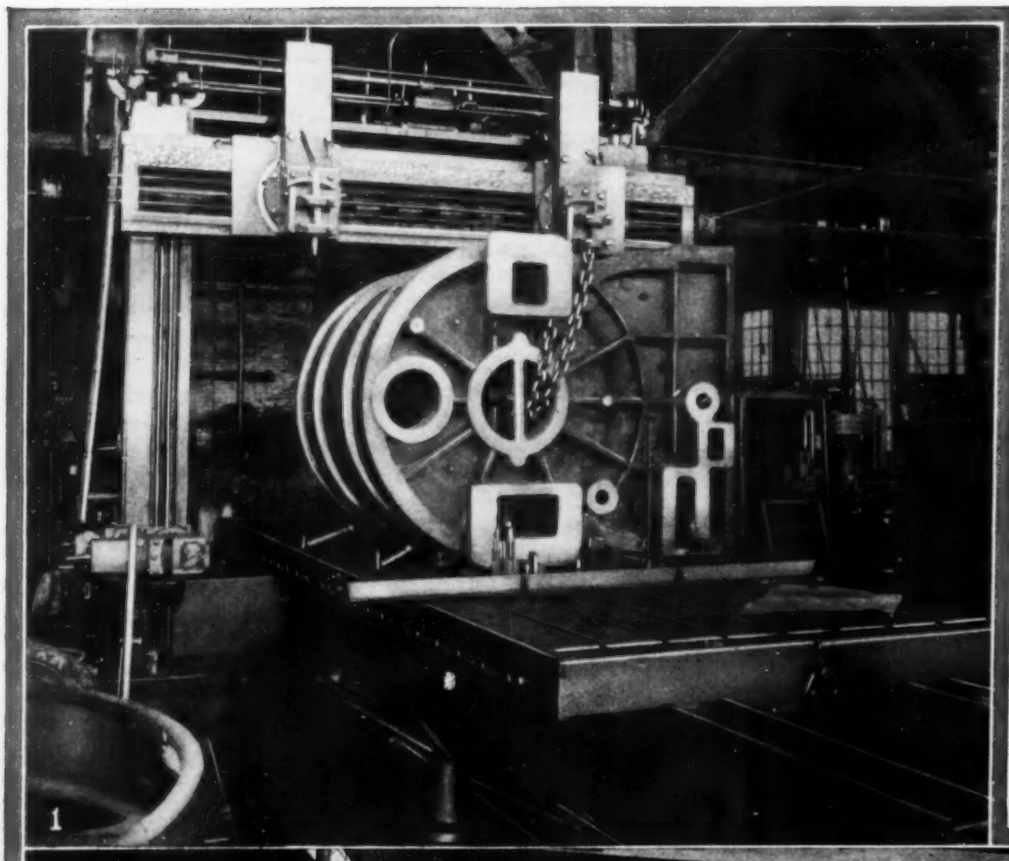
ENGINEERING INDEX, 1927. Eight hundred and ninety-eight pages, 9x6 in., cloth boards. Published by the American Society of Mechanical Engineers, 29 West 39th St., New York City. Price to members $7.50; to non-members $8.50.

THIS volume is to be the last covering only the most important articles in somewhat limited fields of engineering. Although it contains over 18,000 references on more than 5,000 subjects, it is to be extended in succeeding years to cover all articles of any apparent engineering interest found in over 1,700 technical publications taken by the Society. Since these journals come from 37 countries, and are printed in 17 languages an appreciation of the completeness of the recently initiated card index service may be gained. Since this service was inaugurated on Jan. 3, 1928, this volume is complete to that date only, contrary to previous practice. Each succeeding year will find this index covering all items of the weekly card index compiled so that the resulting volume will have a bulk three times that of the present one.

FOREIGN COMMERCE AND NAVIGATION OF THE UNITED STATES. CALENDAR YEAR 1926, VOL. II. Six hundred twenty-seven pages. Published by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. Price $1.75. This volume contains the summary tables of domestic exports of commodities by countries, and also tables of the imports by countries. The commodities are in each case tabulated by important articles or groups of articles, and figures of the four previous years are also tabulated for comparison. The book is cross-indexed for easy reference.

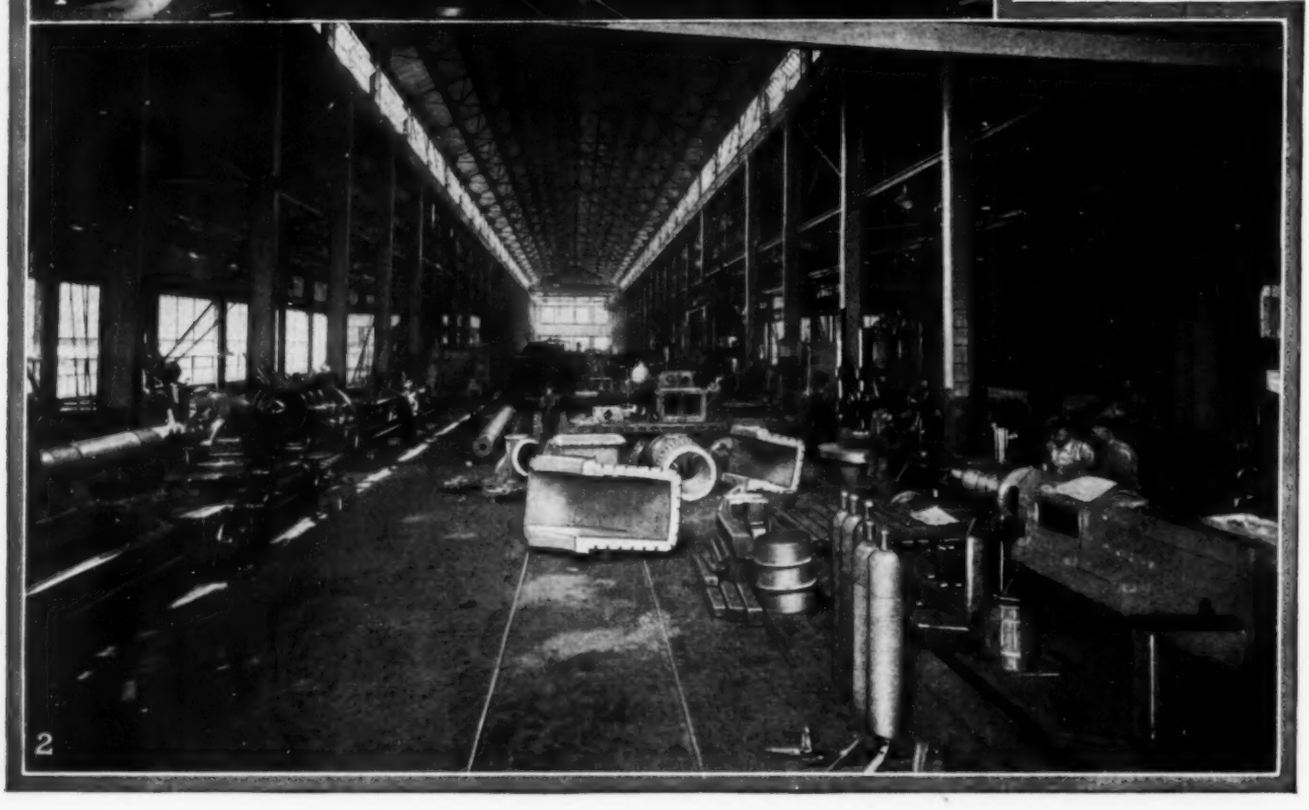
ETUDES SUR LA TRÉFILERIE. Part I, Fabrication of Steel Wire; Part II, Manufacture of Tacks, Nails, and Rivets. Ninety-five, and one hundred eighty-seven pages, respectively, 5⅛x8½ in., paper covers. By R. Papier. Published by the Libraire de L'Usine, 15 Rue Bleue, Paris, France. Price 19.80 francs each postpaid. These two volumes in French form a very complete story of the methods employed in the manufacture of wire products. The first part takes up the operations of wire drawing, illustrating the types of dies used, methods of treatment of the wire, and the annealing and finishing. The second part describes and illustrates various types of wire products, and the dies and machines employed for forming the heads and points of nails and rivets. Both volumes are well illustrated with line cuts and halftones.

Building Heavy Machinery in the South

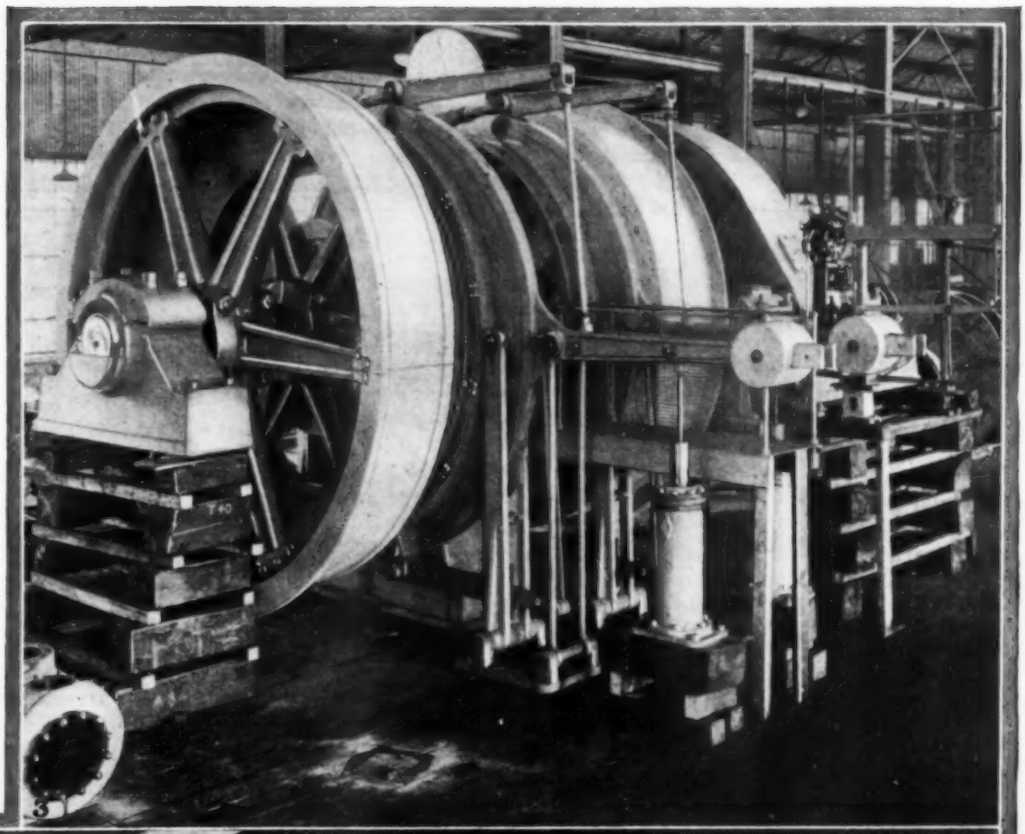


The main machine shop of the Hardie-Tynes Manufacturing Company at Birmingham, Ala., shown below, measures 100x400 ft. The building is of steel frame with brick and zinc sides and concrete slab roof, and is served by two 25-ton cranes. The general work comprises sugar and mining machines, air-compressors, and heavy contract jobs. All castings are of semi-steel of high tensile strength. The shop and foundry employ 450 men

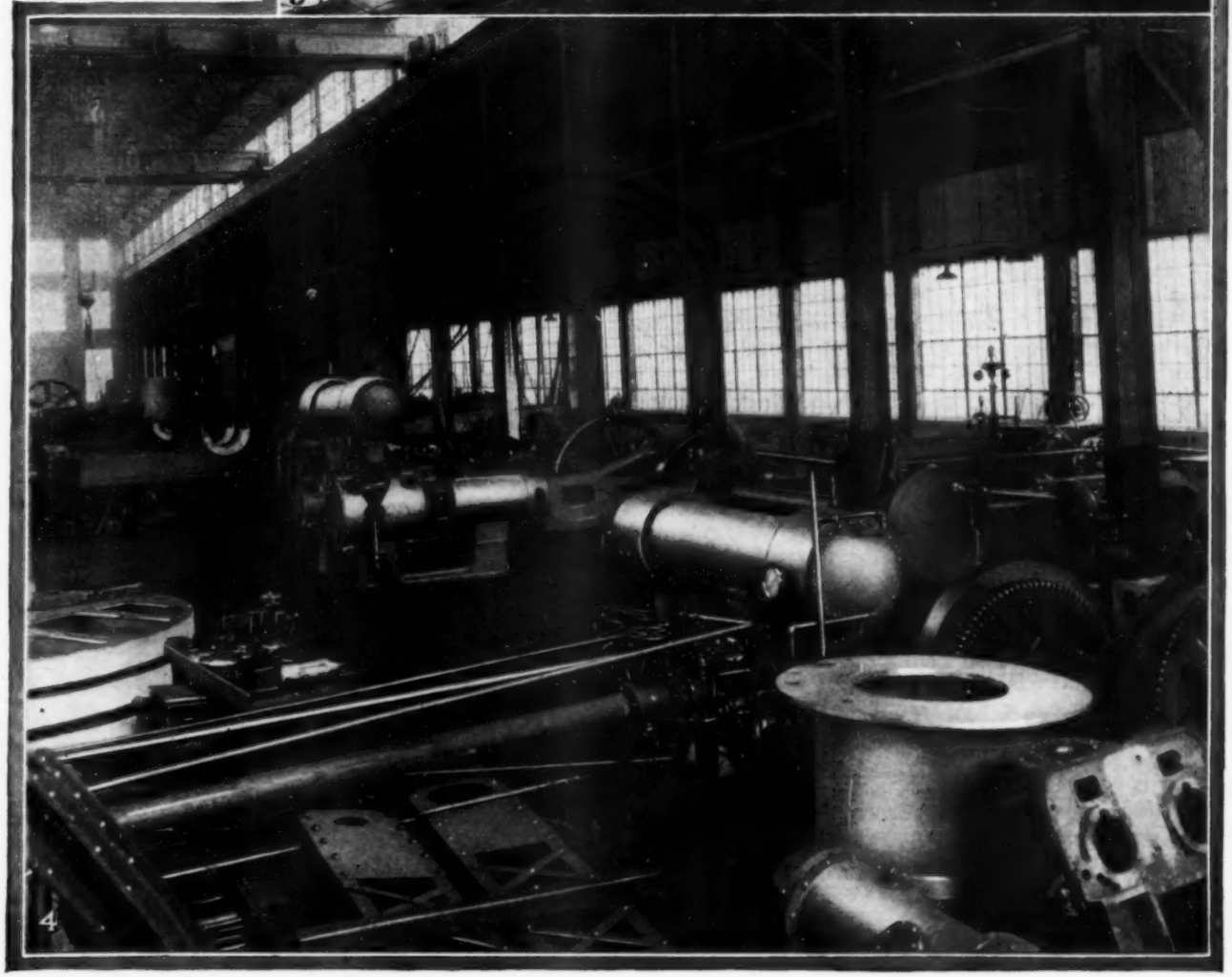
At the left is shown a cylinder of 72-in. diameter bore, for a vessel that limped into a Southern port with the cylinder broken. The pattern was made, and the cylinder cast, machined and delivered in 4 weeks. The cylinder weighed 25,000 lb., and is shown having a cut taken on a 12-ft. planer



Erecting a 2,000-hp. hoist for a coal mine. The drums are 13 ft. in diameter. All parts are made in the shop, and the castings are run from local iron



A view of the air compressor erecting floor is shown below. Heavy compressors up to a capacity of 5,500 cu. ft. per min., delivered air, are built. In the foreground a complete machine is shown in the testing pit



Tremendous Trifles
in the Metal Stamping Business

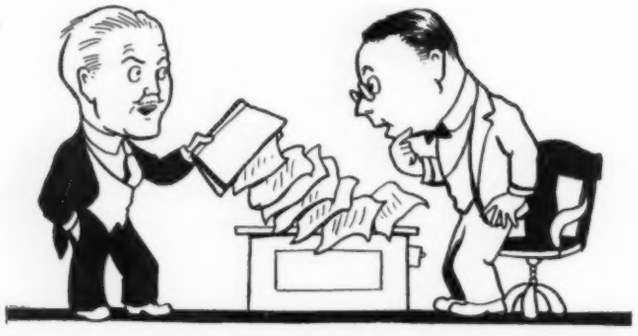
By Robert I. Miner
Consulting Engineer, The Youngstown Pressed Steel Company

Loose Ends to the Order

"WOW!" exploded the service manager as he boiled into the sales manager's office on Monday morning. "Can't you get these cub salesmen trained so that they will just occasionally, at least, turn in an order so that I can tell the shop what's wanted?"

"Well, Art, I'm willing to keep hammering at 'em. Just who is the present cause of your ruffled disposition, and what did he hand you this time?"

"Scarey—the bum—he's been selling now for nearly a year; had two years in the shop, and was around the office for a year or so—he's been working on this gear case contract for a month—last week he lands it—comes in here Saturday morning and lets us listen to how it was done, and makes us like it. Then, when he gets



ready to leave, he dumps this file on my desk and says he hopes we'll have it entered first thing Monday!" and a collection resembling the contents of a waste basket hit the sales manager's desk.

"Hell's bells! I'm used to sifting out reports, figures on miscellaneous scraps of paper, blueprints, sketches and old estimates, to find out where something starts and which way it goes, but I'm stopped on the doping of this one!"

"Cool off, Art, drag up a chair—let's have a look at the stuff—what's in the pile?"

"All right," and Art slumped down on the end of his spine, "Here's what I've got to work on. Here's the customer's order all right, looks good, too, but first thing I see is that the terms aren't according to our regulations. Here's Scarey's report, but no mention of any special arrangement. Next, the buyer orders 5,000 parts at the price we quoted, but he wants 2,500 for the first shipment, and says 'instructions will be given later' opposite the other 2,500. If we operate 2,500 parts we stand a loss, because the 5,000 price is based on that quantity, and if we run the entire 5,000 we not only take up storage space, but I'm going to have to answer a lot of questions from you gentlemen as to what 'later' means. And if 'later' is good and late, the parts will probably get a nice coat of rust, and we'll get a yelp from the customer if we ship 'em."

"Well, isn't that the customer's own lookout, Art?"

"Not by a long shot! No one ever made himself a bed of roses by allowing a customer to head for trouble. I look at these things with the idea that the salesman should go over the path of any order that he takes, and tell the buyer frankly just about what he sees ahead. He will probably be reasonable enough to appreciate that we're conscientiously trying to save him trouble, and operating on uncertain requirements is one of the surest ways I know to get into a peck of it!

"Here's the real joker—a neat little note on the order that asks us to send 25 samples! Just give the once-over to this blueprint, and tell me whether you can picture yourself cutting 25 of these blanks out by hand, and what you think it would be worth!"

"But, Art, I thought we were in on a long pow-wow here a few weeks ago on this same thing. Didn't the old man tell us that when he got that new profiler that we could cut down the time required to make blanks for try-outs?"

"Yes, that's what Scarey thinks too, guess he thinks it's a sort of metal handsaw! Now, Charlie, I'm not starting an argument with you about whether the customer needs these 25 samples or not. The chances are, that having at last let go on a new part, he would like to see the results quickly, and it's a ten-to-one shot that one sample will serve to check all dimensions and satisfy him about the appearance, until we can get into production. And that's exactly what I'm coming to.

"Scarey should know that we will not complete the blanking die until the first sample is approved. If there is any one in this business who has confidence enough to lay out a blank as irregular in outline as this one, and tell the diemaker to go ahead with the blanking die, I've still got to see him! We can hit it pretty close, but the chances are that the try-out man will make several changes after he gets the results from the final forming die, and each time he will order a new bench-made blank

and perhaps two or three. True, they will be roughed out on the profiler, but when working on steel that is an eighth of an inch thick, even that way is slow and expensive, and there will be a lot of filing necessary, with probably plenty of pressure applied from behind!"

The sales manager rang for the chief engineer.

"Jim, here's a tough baby that Scarey has dumped onto Art. New customer, new job, all wanted yesterday, and a whole lot of loose ends that have to be wrapped up. We can't afford to start wrong on this job, and this is what I'd like to have you do. Get in touch with Scarey, and have him make an appointment to go to this plant with you. Don't make it too tough for him,—I know you will handle things so that the customer will see the extra service we're giving, and put Scarey in all the stronger. Art can give you the details, but you will get them in a hurry if you just take a look at the order form. Let's get this thing smoothed out right at the start—it will be the best way I know to educate Scarey in the gentle art of picking up all his belongings, after he has finally collected an order!"

Joints for Welded Frames

The accompanying illustrations show the joints recommended to be used in the welding of plates, angle-iron sections, and beams in building up machinery frames and parts by arc-welding. Where beveling is necessary for preparation the beveled surfaces are set slightly apart from each other or from the flat surfaces to which they are to be welded. When a beveled edge is not used the flat surfaces are placed as closely together as possible, and a fillet weld is used. *(To be concluded on sheet 21a)*

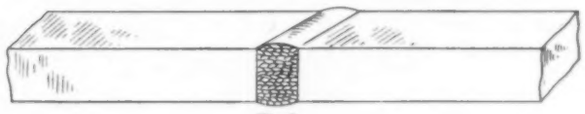


Fig. 1

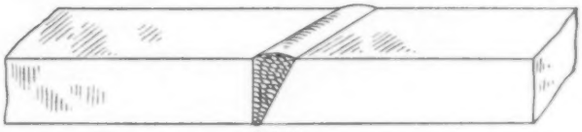


Fig. 2

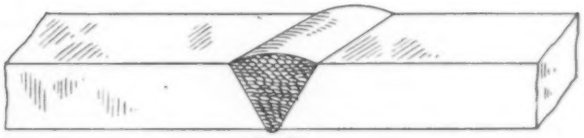


Fig. 3

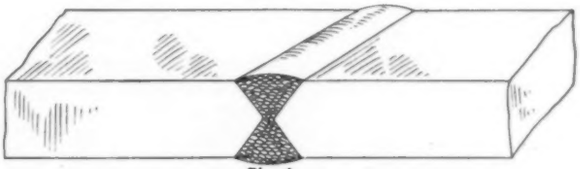


Fig. 4

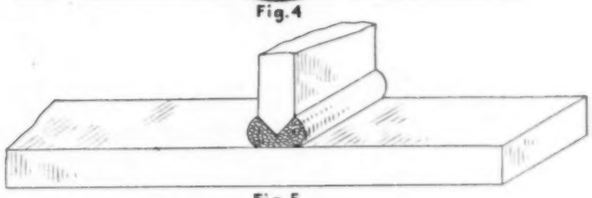


Fig. 5

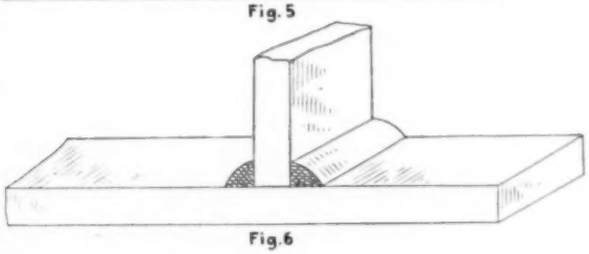


Fig. 6

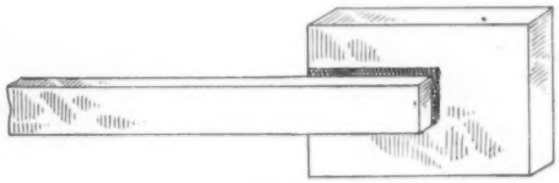


Fig. 7

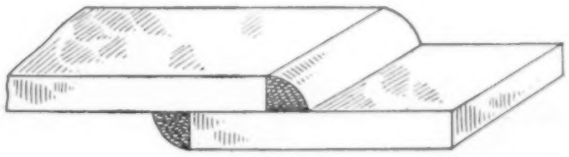


Fig. 8

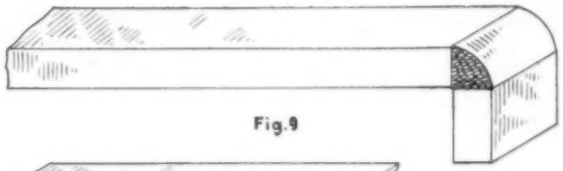


Fig. 9

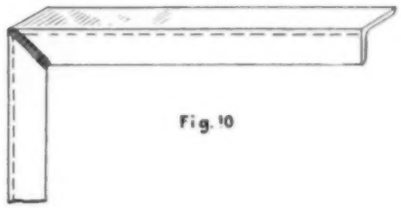


Fig. 10

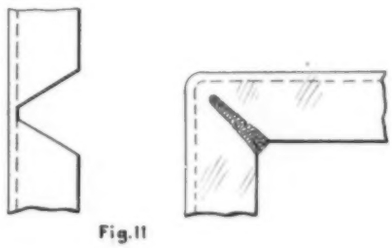


Fig. 11

Fig. 1 — A good joint for stock ¼ in. or less in thickness. No preparation is necessary for a weld of this type. Figs. 2-3—Weld for stock above ¼ in. and less than 1 in. in thickness. The joint shown in Fig. 3 is preferred for stock of medium thickness. Fig. 4—Weld for stock 1 in. and more in thickness. Figs. 5-6—Butt joints for welding plates. The one shown in Fig. 6 is the stronger and more economical, but it has the disadvantage of rougher appearance, and frequently of interference with other members. When it is necessary to machine the corners, or avoid interference, as in jig boxes and machine frames, the type shown in Fig. 5 is used. Fig. 7—A weld for a brace that is strong in both tension and shear. Fig. 8—This type of weld is the best for heavy tensile strains. Fig. 9—A corner weld where the plates do not touch each other. Figs. 10-11 — In making table or truck frames where angle is used the joint shown in Fig. 10 is used, but requires considerable preparation and a jig to hold it while welding. In Fig. 11 is shown a joint that is easier to make

Courtesy of the Westinghouse Electric & Manufacturing Company

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· TECHNICAL · ABSTRACTS ·

Progress and Plenty

The chief reason for our economic troubles is lack of buyers. We need knowledge concerning the flow of goods in relation to the flow of income, and, on the basis of such knowledge, the courage to act so that consumers will receive enough money to buy the finished goods continuously and not for brief periods only as at present.

The government is the best agency for collecting this information, since it is the only agency which represents everybody and which has sufficient authority. We suggest that the responsibility be fixed on a Federal Budget Board, created for the purpose. The Federal Reserve System was created for financing production, and is performing that work admirably. Let us have a new agency which will do as much toward financing consumption as our old agencies have done toward financing production. The first function of such a board would be to make reports of its findings concerning business conditions, and the second to advise the government.

The government should take all such data into account in its own fiscal operations, without exception. Everybody agrees that it would be splendid for somebody to do something towards pushing forward government work in times of depression, but nobody does it. No federal department has any money to spend which has been appropriated with a view to stabilizing business. No department has sufficient leeway in the use of its funds to accomplish much; and no department has sufficient information as a basis for action, or sufficient urge to act.

We are urging a plan through which the government, by more intelligently using the power it already has—including the spending of the billions which it is certain to spend anyway—will lead the way so that private business may act more intelligently. Under such a policy the government would make its own expenditures with reference to business needs, slackening its competition with private concerns for men and materials precisely when competition is keenest, and adding to the income of buyers precisely when business is falling off.—William Trufant Foster and Waddill Catchings, *The Century Magazine,* July.

The French Automobile Industry

The French automobile industry produced in 1927 about 190,000 cars and trucks, and will produce well over 200,000 this year. The total capital invested in automobile factories is estimated at 4,000,000,000 francs, and the total number of employees at 400,000. France holds second place in Europe in the production of automobiles, England holding first place.

In France, more than 100 firms produce passenger cars and 70 build trucks. Comparing this with the United States, the French industry, with almost three times as many different makes, produced less than one-seventeenth of the number of automobiles. The average production of the smaller companies is almost incredibly small. Many are family enterprises which, despite many years' existence, have never been able to extend their influence beyond their immediate locality. The bulk of the French production is in the hands of a few leading manufacturers, and in 1927, three firms alone accounted for more than 78 per cent of the total output.

Besides the large number of firms in the industry, the diversity of their products is manifold. A classic example is the Renault Company, whose range of products includes trolley cars, military tanks, aviation engines, cars, trucks, and many other items. French manufacturers also have a wide range of models, and only a few firms concentrate on a single model. The most important automobile factories in France are fairly well equipped, the Citroen plant being regarded as among the most efficient. Citreon employs thousands of American tools, ranging from portable electric drills to the heaviest variety of presses. —H. H. Kelly, *Commerce Reports,* June 4.

Intra-Plant Standardization

Many individual plants have not yet made the most of the possibilities afforded by intelligent intra-plant standardization. The individual manufacturer has an infinitely greater opportunity to secure the many benefits and economies of standardization than is possible solely through co-operative movement within an entire industry.

Relatively few plants have developed a set of material standards with sufficient thought and study to realize the full benefits. The Union Pacific Railroad furnishes a good example of the benefits of such a study. A forty-six per cent reduction was made in the number of items carried in stock, thus releasing $18,000,000 tied up in stores inventories.

Component parts open another fertile field for intra-plant standardization. Deer & Company found that for every newly developed machine a special seat was being designed, until a sizable array of dies and other tools for making these seats were tying up considerable investment. Now every piece of machinery, whether a plow or a corn planter, is equipped with a standardized seat. Levers, latches, chains, sprockets, springs, and similar machine elements were likewise standardized.

While the philosphy of standardization has had a wide acceptance among business executives, the virtually unlimited opportunities for applying its principles have not and are not being fully realized in most of our industrial and commercial institutions. Some of the as yet unexplored fertile fields for standardization are equipment processes, working conditions, finished products, crates and cartons, and terminologies.—Paul E. Holden, *The Annals of the American Academy of Political and Social Science,* May.

Modern Trends in Metallurgy

The borders of metallurgy are being rapidly extended by the development of pure metals with their increased corrosion resistance, through new alloys with unusual properties, by different methods of using well-known metals, and through new methods of testing. Within the last decade heat-treatment, formerly applied only to ferrous metals, has been extended to the heat-treatment of non-ferrous alloys, such as the brasses, bronzes and aluminum alloys.

Alloy steels were formerly restricted almost entirely to military uses, but today they are essentials without which the automotive industry could not exist.

Formerly, cast iron was merely cast iron, but present-day research shows us that two cast irons of the same chemical compositions may have differing mechanical properties. These variances are due to differences in structure. Thermal treatment, such as the correct pouring temperature and rapid chilling of the metal in the molds, is also very important. The use of alloy steels, particularly those of electric furnace origin, carefully heat-treated, has shown a very rapid advance in aircraft manufacture, where not many years ago the cry was for non-ferrous light alloys.

A development of recent years has been the production of metals of extraordinary purity. Zinc, lead, and tin of almost perfect purity have been produced electrolytically, and these pure metals show greater ductility and resistance to corrosion than the ordinary refined metals. Electrolytic iron is produced 99.965 per cent pure iron, and is so ductile that after annealing it can be drawn down to wire of 1/25 of its original diameter without need for further annealing. Its corrosion resistance is markedly superior to steel.

Another phase in the present trend in metallurgy is toward the production of metals from their ores by low temperature methods instead of by high heat. By the new methods slags are eliminated, difficult refractory problems are almost completely obviated, production costs are cut down, and greater efficiencies are obtained.—C. L. Mantell, Houghton's *Black and White,* June.

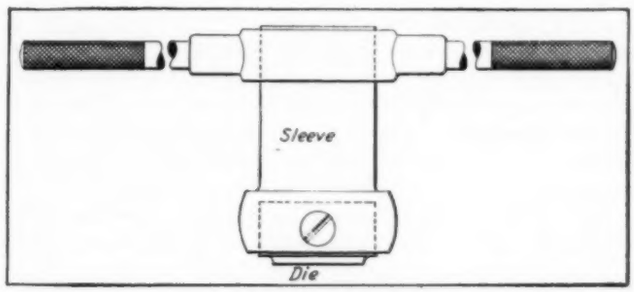
IDEAS · FROM · PRACTICAL · MEN

The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit

A Die-Stock Extension

By Edwin Kilburn

The illustration shows an extension for an ordinary die-stock to adapt it to rethreading U-bolts, automobile spring clips or other articles having two threaded ends lying beside each other and too close together to permit operating the die in the usual manner. The extension consists of a sleeve, one end of which is made to fit



Die-stock extension

the die-stock in place of the die, while the opposite end is bored to receive the die, which is secured in position by a headless setscrew. The headless screw is much shorter than the usual knurled head screw used in die-stocks, and therefore reduces considerably the swing necessary to operate the die.

Fixture for Holding Multiple Parts

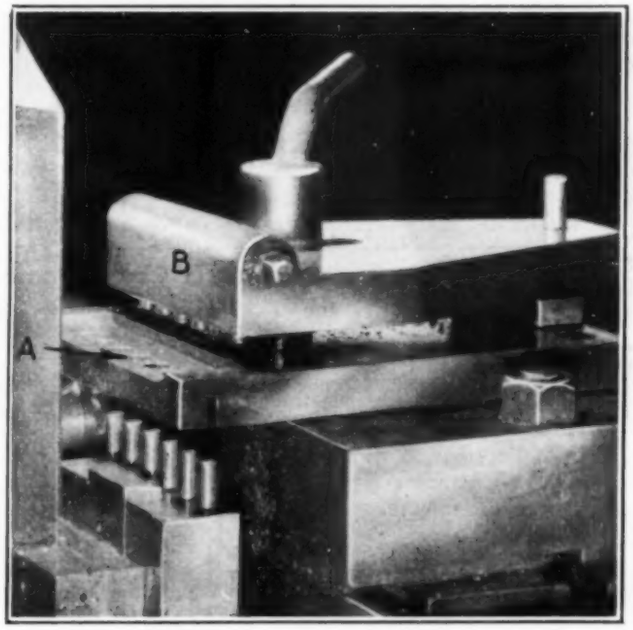
By D. Baker

The fixture shown in the illustration was designed to hold six pieces of work while they were slotted from below. Holes to hold the work were drilled at *A*. The clamp *B* was fitted with six hardened, ground and lapped pins, so located that when the clamp was in position they would be directly over the work in the holes.

The holes for the pins in the clamp pass to a blind hole drilled at right angles to them, the outer end of which is fitted with a pipe plug. This hole is filled with melted beeswax and then closed by the plug. In operation, when the clamp is tightened, with the pins over the work, the pins adjust themselves to any inequality of the work by displacing the beeswax. There is no danger of the pins falling out of the clamp, because the adhesiveness of the wax keeps them in place.

A slide mounted on the column of the machine below the fixture, is fitted with six pins in line with the holes for the work. When this slide is raised up by a lever (not shown), the pins eject the work from the fixture.

The fixture was used continuously, both night and day,



A fixture having a self-adjusting clamp

for more than a year, and the only adjustment required was to add a little more wax, so that the clamping lever would come to a stop in a convenient position when the work was clamped. This adjustment was made necessary by wear of the clamping nut and its seat on the clamp, and not because any wax had been lost by leakage.

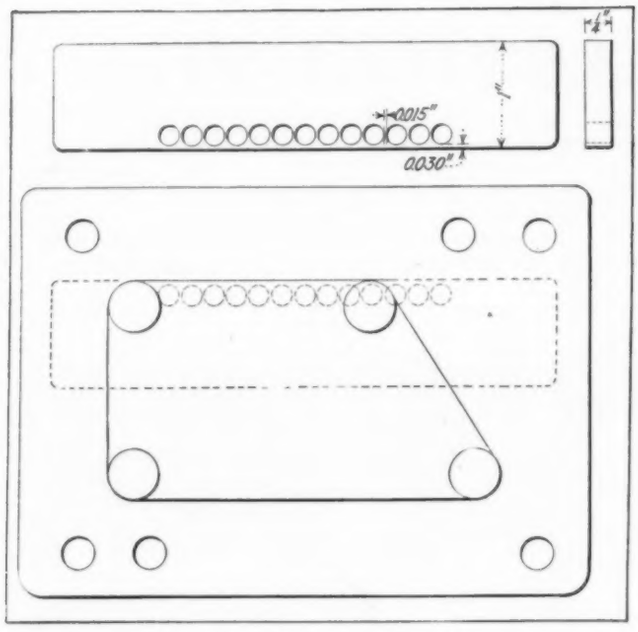
A Time-Saving Spotting Plate

By Walter W. Yaeger

The sketch illustrates a simple time saver that most diemakers will find can be used to advantage at some time, and which I believe will give better results than the layout method. It is used for spotting holes on the inner contour of a die layout preparatory to cutting out the metal inside the lines.

A piece of $\frac{1}{4}$x1-in. gage steel having a series of holes carefully laid out and drilled, leaving walls of about 0.015 in. between holes, is recommended. The wall from the edge of the block to the holes is usually 0.030 in. This allows a margin of safety on the contour line after the holes are enlarged so as to break through.

The method of use is to lay the edge of the spotting plate on the inside of contour line of the die and to spot the holes as shown. The thickness of the walls between the ho'es, and the sizes of the holes are optional, varying with the size of the die. For my own use I find a No. 22



Spotting plate for die work

drill about the correct size for the holes in the spotting plate.

It is advisable to lay out the holes far enough back from the edge to prevent cracking in hardening, and then to grind the edge so as to leave a wall of the desired thickness. Likewise, it is advisable, in this case, to quench the spotting plate in oil.

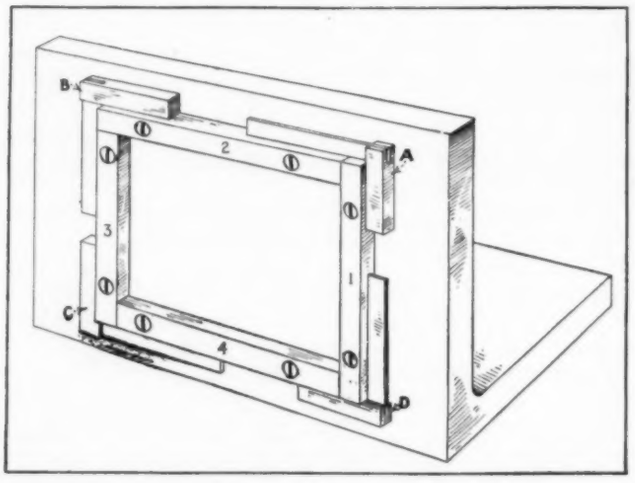
A Simple Set-Up for Testing the Accuracy of a Square

By James McIntyre

The usual method of testing a square is by comparison with another square that someone swears is accurate. A better method is one that will multiply the errors, as shown by the set-up in the illustration.

In the sketch, the numbers 1, 2, 3 and 4 indicate parallels held against an angle plate by screws that are loose fits in the clearance holes. This looseness gives enough play to permit a slight adjustment of the parallels in relation to one another.

Parallel No. 1 is tightened against the angle plate, while the others are left loose enough to allow them to be adjusted by light blows with a mallet or a soft hammer.



Device for testing squares

With the stock of the square against parallel No. 1, as indicated at *A*, parallel No. 2 is tapped until it registers with the blade, and is then tightened. The same operation is repeated with parallels Nos. 2 and 3, and 3 and 4, successively, the stock of the square being indicated by the letters *B* and *C*. Finally, if the square is placed with its stock against parallel No. 4, as indicated at *D*, any error will be shown by light passing between the blade and parallel No. 1, and the error will be multiplied four times.

To true the square, the blade must be adjusted as nearly as possible to one-fourth of the error shown and then retested as before described. By several such tests and adjustments the square can be made accurate. If there is no provision for adjusting the blade, it must be ground.

Boxes for Protecting Connecting Rods

By Frank C. Hudson

Handling finished work without damage is quite a problem and in many shops the amount of waste time due to repairing such damage, is far more than many realize. Connecting rods are supposed to be straight and the holes parallel. Yet many of them become bent or twisted, even if ever so slightly, unless they are handled carefully after machining and before assembly.

The Hupp Motor Company provides wooden tote boxes for storing and transporting finished connecting rods, a small stack of the boxes being shown in the illustration. Half-round wooden strips are used to locate the large ends of the rods, while the small ends fit between parallel strips.

Boxes for storing finished connecting rods

Each layer consists of six rods, a set for a single engine, and the caps are placed over each rod, the caps on the lower layers being held in place by the rods above them. These boxes allow the rods to be stored very

compactly and have been found to answer all requirements. Their size can, of course, be varied so as to hold eight rods in a layer, or to hold rods after the caps have been bolted in place.

Tools for Turning Balls in the Drill Press—*Discussion*

By Joseph E. Abbazia

The tools described in an article by Charles S. Hazard under the title given above, on page 386, Vol. 68, of the *American Machinist*, are good and will do the work.

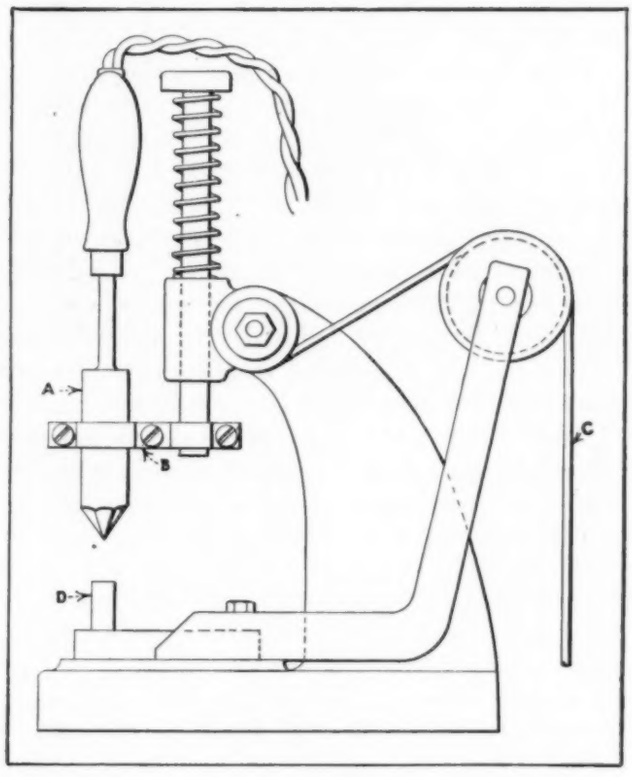
However, I would suggest that the cost of the fixture could have been saved if Mr. Hazard had turned the balls in a lathe equipped with a compound rest. If the nuts on the bolts used for clamping the compound rest to its base are adjusted so as to allow the rest to be rotated, and a tool is properly located in the toolpost, a ball can be turned by swinging the rest about its center.

Of course, the compound rest must be so located on the cross-slide that center of rotation is directly below the center line of the lathe spindle.

A Production Soldering Fixture

By J. S. Browne

The soldering fixture shown in the illustration was made cheaply from a standard electric soldering iron and an ordinary small hand press, and has served for the production soldering of hundreds of thousands of small parts at a great saving of time and labor. The electric soldering iron *A* was simply attached to the spindle by the flat piece of steel *B*. The hand lever was removed and the press was arranged to be operated by the rope *C* passing over an ordinary sheave and connected with a treadle under the bench. The seat *D* can be made to suit the work, but in this case it simply consisted of a round pin on a block. The parts were assembled on the pin, the solder in the form of wire was dipped in liquid flux, and the soldering iron brought down by the treadle on top of the end of the wire solder. The action is instantaneous, and as soon as the treadle is released, the soldering iron is brought up again by the action of the spring.



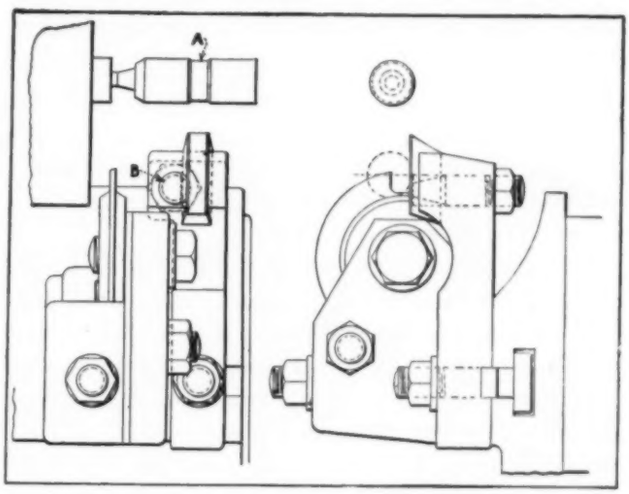
Production soldering fixture

Shaving-Tool Holder for Use With Regular Toolpost

By Henry Simon
Jena, Germany

The illustration shows an arrangement which, while there is no frequent use for it, is likely to be very useful when the need for it does arise. It is a holder for a shaving tool, so made as to allow it to be placed by the side of the regular cross-slide toolpost on an automatic screw machine, so that both slides would still be available for cutting off, forming, or other side operations.

In the particular instance illustrated, some special operations on the piece rendered it necessary to form the shallow collar *A* ahead of the rest of the form, and it was not desirable (indeed not practicable) to use a swing tool for the cutoff. By the use of the shaving tool, this aim was easily attained without any inconvenient features being introduced, and a little time was even saved on the forming, the last of which would have had to be very slow otherwise because of the small diameter of the last step in the head, and the distance of the collar from it.



Holder for a shaving tool

The holder consists of a piece of square cold-rolled stock, milled to leave a head for accommodating the cutter clamp screw *B*. It is held in place on the cross-slide by a T-bolt in the usual way. A regular lathe bit, ground to the cross-section shown, serves as the cutter. By forming the head of the holder toward one side or the other of the body, the cutter can be applied to the piece at almost any desired distance from the face of the circular tool.

While this holder is restricted to narrow forms, it can be readily adapted to several diameters by merely varying the height of the cutter.

American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

Established 1877

Beginning Volume 69

WITH this issue begins Volume 69 of the *American Machinist,* founded in 1877, and now more than fifty years old. Jackson Bailey was the first editor. He has been succeeded by Frank F. Hemenway, Fred J. Miller, Frederick A. Halsey, L. P. Alford, John H. Van Deventer, Ethan Viall, and the present editors.

The editorial staff now consists of Kenneth H. Condit and Fred H. Colvin, editors; L. C. Morrow, managing editor; and S. Ashton Hand, Frank W. Curtis, F. J. Oliver, Jr., George S. Brady, H. R. LeGrand, and William H. Shipman.

McGraw-Hill Extends Publishing Activities

EXTENSION of the McGraw-Hill publishing activities to the whole American business world is the significant result of the merger of the A. W. Shaw Company, of Chicago, and the McGraw-Hill Publishing Company, Inc., announced elsewhere in this issue.

Heretofore the magazine publishing activities of the McGraw-Hill organization have been confined to a specialized service to major engineering industries and the trade channels for distributing their products. The book division of the organization, however, has long since broadened its scope; it publishes books not only for the engineering and manufacturing fields, but for general business and scientific agriculture. Through the merger the McGraw-Hill institution now acquires, in *The Magazine of Business,* a medium by which it can speak to the whole range of American business. *The Magazine of Business* has a circulation of more than 150,000 copies and deals with the problems fundamental to all business, such as those of finance, production, distribution, sales, export trade and management. It treats, as well, those major movements in legislation which bear upon business, such as taxation, tariff, and government regulation of business.

The importance of this new extension of the McGraw-Hill activities is apparent to all who have followed the standards which, under the leadership of James H. McGraw, have dominated its publications. To give the best of which they are capable is his constant admonition to the publishers and editors working under his direction.

It is not without significance that the concluding sentences in Mr. McGraw's announcement of the merger, in referring to *The Magazine of Business,* were these: "It will fight for the interests of business but it will place in an equally important position the responsibility of business to the public. It will, in a word, stand for true business statesmanship."

Hoover, Agricultural Engineers and the Farm Problem

WHEN Secretary Hoover, recently, received a large delegation of agricultural engineers, he commended them for their belief in fact-finding before advocating theories. His statement unquestionably was a thrust at the equalization fee and an indication that he looks to the agricultural engineer for sound alternatives.

He will not be disappointed. This group of engineers long since pointed out that labor and power are the large items of production cost in their industry, in some instances accounting for 85 per cent of all costs. They realize that the sound way to help the farmer is to increase the output per worker and provide cheaper power. They have called attention to the fact that since 1870 steel production has increased seventy fold, while corn production increased three fold. The steel industry went into every field and developed new uses for its products. Agriculture did not, but its engineers say that it must.

There has not been enough engineering in agriculture. The engineer wants to see farm values based on earnings rather than on the speculative value of land. Machinery already has greatly increased the per capita output of the farm worker. By further improving equipment and by stimulating its more extended use the desired end of large production at low cost per worker will be obtained. Secondary industries in agricultural areas should be established to absorb the excess labor. In this way there is a ready movement of labor from producing operations to nearby processing operations. Freight rates must be so arranged as to promote processing near the source of raw materials.

Agricultural engineers are insistent that the farmer follow his products through to the ultimate consumer and keep in close contact with him. They want to see better management and better marketing. With the support they will have from Herbert Hoover they will make an important contribution to the solution of the farm problem in which eastern industry is extremely interested.

· SHOP · EQUIPMENT · NEWS ·

Trent Pot-Type Electric Heat-Treating Furnace

QUICK response to heat application is characteristic of this line of pot-type electric heat-treating furnaces which have been developed by the Harold E. Trent Company, 439-43 North 12th Ave., Philadelphia, Pa. The furnace shown in Fig. 1 is typical of the PF-300 and PF-500 sizes. Fig. 3 shows the heating element which is placed in an annular cavity of the furnace as shown in Fig. 2. The design of this heating element has resulted in the cutting down of space and, in turn, has reduced the overall diameter without loss of insulation value. The reduced diameter has lessened the heat radiated, as well as the floor space occupied and permits the operator to approach closer to the work.

Fig. 1—Trent Pot-Type Electric Heat-Treating Furnace

As shown in Fig. 1, the cover lifts away from the pot in two halves by means of counterbalanced weights and, therefore, offers no interference between the thermocouple and the working surface of the furnace. The terminal boxes are arranged for single-, two-, or three-phase circuits, according to the size of the pot and the customer's requirements. The voltages which may be used are 110, 220, and 440, respectively.

The crucible in the pot-type furnace is made of the usual high temperature alloys, and is not recommended for temperatures higher than 1,700 deg. F. As can be seen in Fig. 2, the crucible is supported on a casting partially imbedded in the furnace above the refractories. The heat overflow due to the apron is negligible, as the design eliminates heavy and large exposed surfaces of metal.

Sturdy voltage insulators support the heating element within the annular cavity, which is 1¼ in. between the walls. These insulators interlock when placed in position, and the space left behind them is filled with an insulating powder. The heating element is rigid in its vertical members, but is flexible horizontally so that it may be formed around the inside of a furnace. It will be noted that the ends are of a relatively heavier cross-section than the vertical strips. The fact that the strip is relatively thin

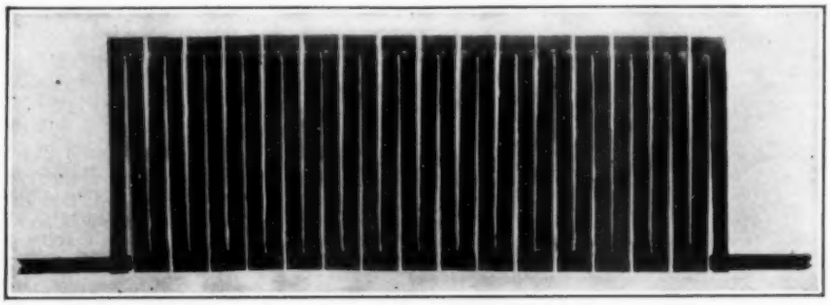


Fig. 3—This flexible heating element permits smaller overall diameter of the heat-treating furnace

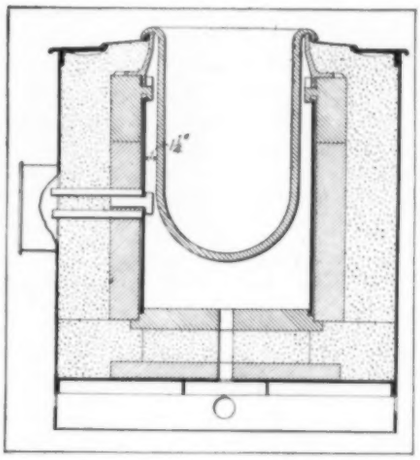
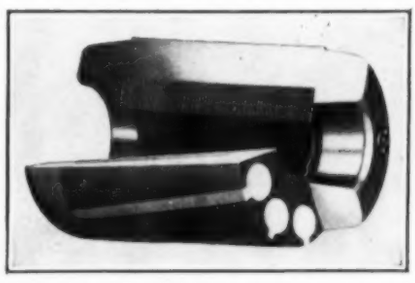


Fig. 2—Cross-section of the Trent Furnace

enables it to be safely placed against the face of the insulation and the cavity, being small, insures rapid heating and long life because the maximum radiation surface is realized. The terminals are of strip Nichrome welded to the unit and are carried through bushings to the terminals in the terminal box.

"Uniloy" Jointless "Hicycle" Rotor

No joints and a one-piece conductor element are the principal features of the "Uniloy" jointless rotor which has been announced by the Chicago Pneumatic Tool Company, 6 East 44th St., New York, N. Y. This squirrel-cage rotor is interchangeable with the older type used on the "Hicycle" portable electric tools made by the above company. A sectional view of the Uniloy jointless rotor is shown in the illustration.



Sectional view of the "Uniloy" Jointless "Hicycle" Rotor

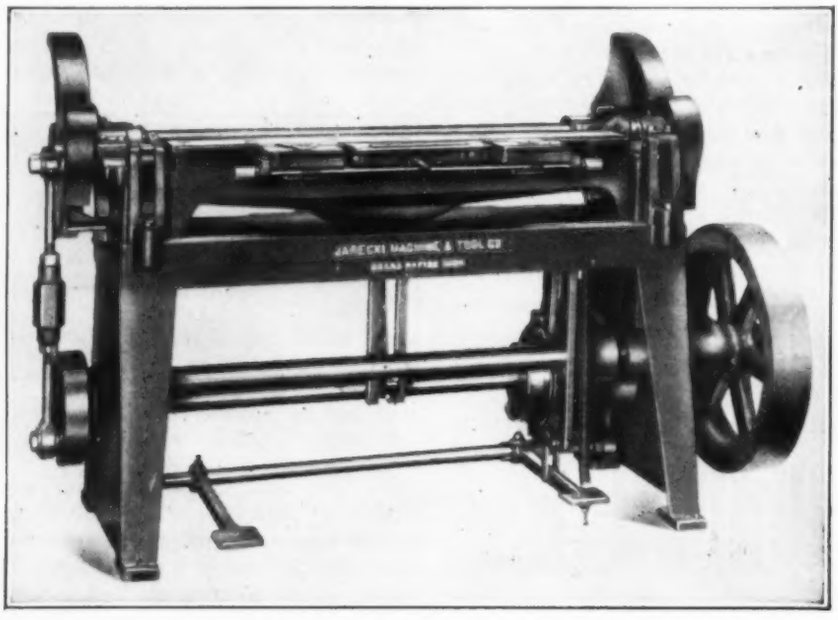
The Uniloy rotor provides a homogenous conductor without joints and

having a coefficient of expansion practically the same as the rotor core so that there is no danger of undue mechanical strains being set up in it. Tapered collars prevent dust and dirt from accumulating. The alloy used provides a rotor having the following additional advantages over rotors previously used: less weight, more power and a removable shaft.

Jarecki 42-Inch Power Folder

Folding of sheet metal up to No. 16 gage along the full length of 42 in. can be accomplished by this power folder which has been announced by the Jarecki Machine and Tool Company, Grand Rapids, Mich. A center bearing is provided to take care of springing, so that as much pressure will be applied at the center of the sheet as at the ends close to the bearings.

The machine is driven on both ends of the shaft to give an even distribution of the pressure on the sheet and eliminate any tendency of weaving of the machine frame. Although the machine folds pieces up to 42 in. in length, it can be built longer if required. Where it is necessary to minimize springing, as many hinged bearings as are required can be placed along the machine. Sufficient power is provided by a flywheel weighing 250 lb. running at 100 r.p.m. The ratio of the gearing is 3 to 1. The machine can be built either for belt or motor drive. It has a height overall of 42 in. and occupies a floor space of 30x72 in. The weight is 2,400 pounds.



Jarecki 42-Inch Power Folder

Trade Catalogs

COMPRESSORS. The Pennsylvania Pump and Compressor Co., Easton, Pa., has published Bulletin No. 140, giving the specifications of its single-stage, double - acting, multiple - belt - driven, semi-portable air compressor. The unit is illustrated by means of a photograph.

LEATHER PACKING. E. F. Houghton & Co., Philadelphia, Pa., has published a folder entitled "Common Troubles Encountered in the Application and Use of Leather Packings." Several forms of packing are shown. In addition, a list of distributors of Houghton products is given.

OPENING DIES AND COLLAPSING TAPS. The National Acme Co., Cleveland, Ohio, has published a catalog describing "Namco" opening dies and collapsing taps. The opening dies which are made in two styles have all the parts shown by means of a photograph. Collapsing taps are also made in two styles and the dimension tables are given. Of particular interest are the chasers which are tabulated for regular stockable and non-stockable thread sizes. Additional space is devoted to "Namco" opening die heads, also built in two styles. Grinding charts for die chasers are included. The catalog contains 24 7¾x5-in. pages.

Pamphlets Received

AERONAUTICS TRADE DIRECTORY. The Department of Commerce, Aeronautics Branch, has published Bulletin No. 3, known as the "Aeronautics Trade Directory." It is divided into two sections: Part I discusses commodities, and Part II the activities of airway operators. The pamphlet contains 29 10x8-in. pages and can be obtained from the U. S. Government Printing Office, Washington.

ELIMINATION OF WASTE. The U. S. Department of Commerce has issued bulletins R-66 and R-72, on simplified practice for the elimination of waste entitled "Automobile Brake Lining" and "Solid-Section Steel Windows." The benefits of simplified practice to the producer, manufacturer, jobber, wholesaler, and retailer, are given in both bulletins. The former deals with various recommended thicknesses and widths of brake lining. The latter bulletin deals with horizontally pivoted, vertically pivoted and horizontally rolling windows, projected windows, counterbalanced windows, swing doors, and slide doors. Both bulletins are available from the Government Printing Office, Washington, D. C., the former selling at 5 cents and the latter at 20 cents per copy.

OXYACETYLENE WELDING IN THE FOUNDRY. The Air Reduction Sales Company, 342 Madison Avenue, New York, N. Y., has published a paper entitled "Oxyacetylene Welding in the Foundry," by G. F. Wieser. The reasons for defects in iron or steel castings are given and the methods of welding used, so that salvage can be effected.

THE BALANCE OF INTERNATIONAL PAYMENTS OF THE UNITED STATES IN 1927.—The United States Department of Commerce, Bureau of Foreign and Domestic Commerce, has published a pamphlet entitled "The Balance of International Payments of the United States in 1927," by Ray Hall, Assistant Chief, Finance and Investment Division. This is the sixth consecutive annual study and shows our cash dealings with foreigners during the year 1927. The broad purposes of the study are, of course, to obtain a full understanding of the larger international transactions, to discover how much we pay out nationally and how much has been paid to us, so that we may be able to form sound judgments of the economic condition of foreign nations and other important information with regard to the capacity of foreign people to purchase American goods or to repay obligations. This trade information bulletin No. 552 contains 56 9x6-in. pages.

NEWS OF THE WEEK

McGraw-Hill and Shaw Companies Complete Publishing Merger

Twenty-three papers involved in the consolidation

A CONSOLIDATION affecting two large publishing interests was brought about on June 29 by the merger of the McGraw-Hill Publishing Co., Inc., of New York and the A. W. Shaw Co., of Chicago.

The Shaw organization publishes *The Magazine of Business, System* and *Industrial Distributor and Salesman*, while the McGraw-Hill organization is the publisher, either directly or through subsidiary and affiliated companies, of over twenty leading business papers, and of engineering and business books. Its magazines cover the electrical, mechanical, construction, mining and chemical fields, and include such well-known papers as *Electrical World, Engineering News-Record, Power, American Machinist, Engineering & Mining Journal, Chemical & Metallurgical Engineering* and *Radio Retailing*. The two companies have had a close relationship since last fall when they jointly formed the McGraw-Shaw Co., which publishes *Factory and Industrial Management* and *Industrial Engineering*.

A. W. Shaw will continue as chairman of the board and James H. McGraw will become president of the A. W. Shaw Co. Mr. Shaw will also become a director of the McGraw-Hill Publishing Co., Inc., and will continue as president of the McGraw-Shaw Co. Wheeler Sammons will become a director and member of the executive committee of the McGraw-Hill Publishing Co. and senior vice-president and general manager of the A. W. Shaw division of the business, which will be known as the "A. W. Shaw Company, a division of the McGraw-Hill Publishing Company, Inc." The McGraw-Shaw Co. will also be operated as a division of the McGraw-Hill Publishing Company.

Reasons for Merger

Two reasons for the merger are stressed by the officers of the merging companies. The magazines of the two organizations are complementary in character. The Shaw papers cover business broadly, giving the business man an understanding of what is going on in all branches of trade, industry and finance. Their service is extensive in character. The McGraw-Hill service, on the other hand, is intensive. Its magazines give a highly specialized service to given major industries and to related industrial groups. Thus the consolidated companies serve the business man in both his general and special business interests. The second reason is the very evident economy and increased effectiveness of consolidated operation, enabling a superior service to be rendered to the whole sweep of American business.

Mr. Shaw made this comment on the consolidation:

"It is gratifying to me after long years spent in developing the Shaw publications to have them put together with the strong group developed under Mr. McGraw's leadership. The combination will strengthen both groups. *The Magazine of Business* and *System* cover broadly the problems of all business, and exchange knowledge between its different divisions. The McGraw-Hill papers specialize on the problems of a dozen or more major branches of industry and trade. The advantages of joint control of these related but different publications is apparent.

"The merger comes at a particularly gratifying time, when the Shaw organization, following a plan long contemplated, is re-establishing *System*, which was the pioneer general business paper. For more than twenty-five years it was the guide, philosopher and friend of tens of thousands of men conducting the smaller businesses of this country and the administrative work of the larger ones. To this well-discharged task it now returns—and fortunately at a time when the McGraw-Hill and Shaw merger enables a maximum of energy to be put back of the inspiring task of re-establishment."

J. H. McGraw's Statement

Mr. McGraw gave the following reasons for the merger:

"Mr. Shaw's organization and ours have been working closely together for more than a year, and have seen the benefits of consolidated effort between groups having widely different publishing experiences. The Shaw company has had a signal success in publishing magazines of large circulation and of broad appeal to the industrial and business worlds. The McGraw-Hill company has intensively served by specialized publications, the leading engineering industries and the trade channels for distributing their products.

"It was apparent that the McGraw-Hill group of industrial and trade papers would have a new way of carrying the message of common business problems if it were allied with papers like *The Magazine of Business* and *System*. At the same time these publications would be immeasurably strengthened by being tied in with and assisted by the great editorial staff of over one hundred and thirty industrial and business specialists who edit the McGraw-Hill papers. There were also conspicuous opportunities for more effective subscription and advertising work and for economies in every phase of publishing.

"The logic of these opportunities could not be escaped. The merger has been the result.

"Though every paper of the merging companies will be strengthened by the consolidation, and thus render greater service to its readers and advertisers, the most conspicuous result will be the new and strong position of *The Magazine of Business*. Through Mr. Shaw's vision and courage it is a magazine of strength, standing and influence. It now becomes the capstone of the virile group of papers and the other publishing activities of the McGraw-Hill company, thus extending the scope of the latter organization to the whole range of American business. At the same time, drawing on the intimate contact with trade and industry of the large corps of McGraw-Hill specialist editors, it will speak with unexampled authority on the problems of business. It will be able to render an outstanding service to the business men of America by its authoritative information, its expert interpretation, and its fearless advocacy of sound business policies. It will fight for the interests of business but it will place in an equally important position, the responsibility of business to the public. It will, in a word, stand for true business statesmanship."

Railroad Bronzes Studied

No one of the selected laboratory tests, consisting of wear, tension, impact and pounding, can by itself, be expected to yield information which is adequate for general comparisons of the various railroad bearing bronzes now in use, a study just made by the Bureau of Standards, Department of Commerce reveals. The bronzes fall into certain general classes, as regards their wearing and mechanical properties, and each group shows superiority for certain types of service.

This work was undertaken by the Bureau in an effort to secure data which would be necessary if any attempt were made to simplify these specifications. There are almost as many specifications for railroad bearing bronzes as there are railroads. As far as can be judged from laboratory tests, existing specifications can be simplified.

Magnetic Testing Featured at Testing Materials Meeting

MAGNETIC tests to determine the suitability of various steels were featured in the discussion at the thirty-first annual meeting of the American Society for Testing Materials at Atlantic City, June 25 to 29. Among the papers presented was one by Dr. Haakon Styri, director of research, SKF Industries, Inc., on the endurance of high-speed cut-off tools in relation to magnetic and other measurements. A number of standard cut-off tools of high-speed steel were hardened and drawn at different temperatures and used in cutting off rings of high-carbon chromium steel having a Brinell hardness of about 180. The number of rings were counted for each grind of the tool. The combined results indicate that magnetic analysis does not have any relation to the endurance of the tool. On the other hand, hardness measurement and electrical resistance give quite good correlation. The magnetic test, however, showed deviation from a known heat-treatment. The test also showed that the drawing temperature has a great effect on the magnetic reading.

Two Tests Suggested

The author suggested that it may be advisable to test tools magnetically both after quenching and again after drawing. This procedure is practical, since it takes very little time and is not destructive. It is, of course, only comparative at this time. The paper by Dr. Styri is another step in our knowledge of how to standardize metal-cutting conditions.

J. B. Kommers, professor of mechanics, University of Wisconsin, presented the results of his recent tests on cast iron, made with the co-operation of manufacturers in different parts of the country. "The Static and Fatigue Properties of Some Cast Irons" covers ten series of cast iron, each series comprising 31 bars. It was found that tensile, impact, and fatigue tests seemed more sensitive to differences in materials than hardness, compression, and transverse tests. As would be expected, the fatigue results show considerable dispersion on cast iron. Tests on high-strength cast iron indicate that cast iron need not be looked upon as a uniformly low-strength material. An endurance limit of as high as 24,100 lb. per sq.in. was obtained.

The strength of cast iron can evidently be controlled in a manner similar to that in the case of steel. The tests also indicate that the Brinell scale of hardness will be more likely to point out slight differences in hardness than the Rockwell scale. One important conclusion from the test is that an approximate value of endurance limits may be estimated from the other properties, such as tensile strength, compression strength, and modulus of rupture. At the present time, the information on the effect of variable factors in influencing the properties of cast iron is so meager that such approximate determinations should always be checked by direct experiments. The endurance limit proved to be about 50 per cent of the tensile strength and about 25 per cent of the modulus of rupture obtained from the transverse test. No consistent relation was found between endurance limits and chemical composition, a possible explanation being the number of chemical and physical variables involved, internal stresses, or perhaps the previous history of the material.

W. B. Kouwenhoven and Julian D. Tebo presented a paper describing a new method of magnetic analysis, which the authors have called the incremental permeability method. The magnetic properties of high-speed tungsten steel bars were investigated, using this method and data obtained, which makes it possible to differentiate between the heat-treatments received by the specimens. The authors report the incremental test as being easy to apply, quick and reproducible, and, therefore, offering a new tool for use in magnetic analysis.

Several methods of calibrating Rockwell hardness testing machines have been tried out by F. S. Mapes, of the testing laboratory of the General Electric Co. The final scheme involves a steel bar supported on knife-edges with the load applied at the center. With a dial gage below, deflections of the bar can be accurately measured. By using this device in a standard vertical testing machine, the bar was calibrated and then transferred to the Rockwell hardness testing machine and check deflections secured. On three Rockwell machines a maximum percentage of variation of about 4 per cent was obtained. The method seems readily adaptable to commercial use, since it is simple, accurate, and inexpensive.

Ladle Car Transports Hot Metal 10 Miles to Armco Plant

The linking of the American Rolling Mill Co. and the Hamilton Iron and Coke Co. by the transportation of a ladle of hot metal from the blast furnace at Hamilton to the East Works of "Armco," at Middletown, by way of a special track built by the Baltimore and Ohio Railroad took place on June 25. The event marks an important step in the enlargement of industrial activities in the Miami River Valley.

The molten metal will be carried daily over 10 miles of track specially constructed for the purpose. Due to the concentrated load of such large tonnage, it was necessary to design and build a special bridge over the Miami River having almost 50 per cent greater capacity than any other railroad bridge ever built. It requires about 2½ hr. to make a round trip to Middletown; there will be an average of four trips daily.

Three specially designed mixer ladles double lined with fire brick are used to carry the molten metal, which can, when necessary, be held in the ladle 48 hr. The capacity of these ladles is 150 tons each. The metal is poured from the large ladle car into a small open ladle.

Metal being discharged from "Armco" ladle car

shown in the illustration, from which it is poured directly into the open-hearth furnaces for the necessary refining process. This constitutes an important economy over the regular practice of charging cold pig iron into the open hearth, which practice requires many hours to bring it to a molten state.

Platform of Industry Offered

THE negotiation of commercial treaties with other nations, embodying unconditional most-favored-nation clauses, was recently approved by the Platform of American Industry Committee at a meeting held recently in New York under the auspices of the National Association of Manufacturers. The adopted form of the American business platform for 1928 included resolutions dealing with the following important phases of administration.

The policies of the Federal Reserve Bank System has met all requirements, and an assurance of the continuance of these policies, unhampered by political or legislative interference and based solely on economic consideration is, therefore, necessary to business and agricultural progress, the committee believes.

FOREIGN TRADE POLICY

As regards foreign trade policies, the committee incorporated the following resolution into its platform: "Consistent with the established commercial policies of our nation in its relations with other nations, every encouragement should be offered to the development of our foreign trade as to both the exportation of our products and the importation of essential materials for our industries. Recognizing that our protective tariff system has been indispensable to the establishment and development of our industry, we sympathize with the disposition of other nations to employ similar policies so long as they are founded upon the same considerations and involve in their application no discrimination against American products in favor of like products of other nations. To this end we approve the negotiation of commercial treaties with other nations embodying unconditional most-favored-nation clauses. No country other than the United States taxes its nationals resident abroad on income derived from active business in the foreign country of residence. Our foreign traders should be placed on a basis of competitive equality."

In the interest of government and business, the committee urged more reliance upon private energy and character and less upon public law and appropriations. The committee believes that the whole theory of government ownership and operation is repugnant to American traditions, and the platform includes a plank favoring the establishment of a strong American Merchant Marine through private enterprise and government aid in construction and trade. In considering private employment relations, the committee indorsed the thought that mutual good will, essential to the maintenance of the right relation in industry, must originate and be sustained within each establishment, and cannot be imposed by law from without.

The following resolution regarding the Tariff was adopted: In the light of accumulated experience we more than ever indorse the American tariff principle as necessary to the well-being of agriculture, labor and manufacture. We know that a general Congressional revision of the tariff, because of its accompanying agitation, develops long periods of uncertainty profoundly affecting employment, investment, the establishment of new enterprise, and the successful conduct of every form of business. But a continuing revision of our tariff schedules, including the free list to meet changing economic conditions, in the light of accurately ascertained facts, is essential to the proper conduct of international and domestic relations. An independent, non-partisan semi-judicial Tariff Commission presents the only practical alternative to frequent Congressional revision, with all its disturbing circumstances.

Furthermore, unswerving support is pledged to the budgetary control of government appropriation and expenditure, and administrative reform and simplification of the revenue system is urged. The public interest requires that the function of the railroads, motor vehicles on the highways, carriers by water and airplanes be, as far as possible, co-ordinated to relieve unnecessary and destructive competition.

The following subjects also received detailed attention: Agriculture; flood control; immigration; international relations, including foreign debts; judiciary; regulation of combinations; reorganization of government departments, and women in industry. This is the third formulation of a platform of American industry, the first effort being made in 1920, and the keynote of all three has been "more business in government and less government in business." By resolution, it was decided to extend this latest platform into the next presidential year.

Industrial Arts Show at Springfield

Industry in all its branches will be featured prominently in the Industrial Arts Show of the Eastern States Exposition, West Springfield, Mass., from Sept. 16 to 22, inclusive. Included in the list of industrial products and kindred lines that will be shown are chemical engineering industries, coal, industrial and commercial manufacturing, iron and steel products of every type, machinery, marine shipbuilding, including repairs and operations, mining, petroleum, paper and paper products, power plants, printing and publishing, transportation systems, mill and factory supplies, refrigerating industries, manufacture of sporting goods, and welding.

Last year the exhibit occupied 25 acres of space, 5 acres of which was under roof in permanent buildings. In 1927 there were 382 exhibitors, and the exposition attracted an attendance of 287,000 persons.

Machine Tool Builders to Hold Second Exposition in 1929

The National Machine Tool Builders' Association has voted to hold another exposition in the fall of 1929, and the following committee on arrangements has been appointed by the president: Chairman, J. Wallace Carrel, vice-president and general manager, Lodge & Shipley Machine Tool Co.; Henry Buker, vice-president, Brown & Sharpe Manufacturing Co.; R. E. Flanders, manager, Jones & Lamson Machine Co.; Robert M. Gaylord, vice-president, Ingersoll Milling Machine Co.; and James E. Gleason, president and general manager, Gleason Works.

The order of preference for the admission of exhibits to the 1929 exposition has been established as follows: (1) Machine tool exhibits by members of the National Machine Tool Builders' Association; (2) machine tool exhibits by American builders not members of the National Machine Tool Builders' Association; (3) trade press and direct accessories used exclusively on machine tools, such as chucks, small tools, etc.; (4) components and supplies not used exclusively in connection with machine tools, such as anti-friction bearings, driving devices and shop supplies. It is the opinion of the committee that the coming exposition should not be more extensive than the last, which proved sufficiently large to engage visitors for the time that was at their disposal.

Exports of Manufactured Products Gain in First Quarter

An increase in the value of American manufactured products exported during the first three months of the year offset a decline in foreign sales of a number of leading raw materials, says a report on "Our World Trade" for the first quarter issued by the Foreign Commerce Department of the Chamber of Commerce of the United States. Total exports during the period, the report shows, amounted to $1,203,000,000, a first quarter's figure exceeded only in 1925 during the past eight years.

Two-thirds of the principal exports increased in value, notwithstanding a somewhat lower level of prices. With four exceptions these gains were in American manufactured products, in-

cluding a few manufactured foodstuffs. Most of the petroleum products, refined copper, automobiles, agricultural machinery and implements, electrical machinery and apparatus, industrial machinery, printing machinery, office appliances, and leather lined up among the important gains in value over 1927. Automobiles, parts, and accessories are, as the second leading export, accounting for nearly one-tenth of domestic exports in the first quarter of 1928. Exports of automobiles were more than 18 per cent greater than a year ago. Automobile engines were nearly doubled, totaling 47,583 in the first quarter.

Exports of power-driven metal-working machinery gained 52 per cent in value over that of the same period in 1927, while iron and steel plates and strips declined 17 per cent. Structural steel, however, gained in volume 34 per cent. Other gains in volume were: wire, 120 per cent; copper rods, 60; aircraft, 880; calculating machines, 44; tractors, 38; lathes, 58; milling machines, 90; iron and steel scrap, 215; metal filing cases, 78; and air compressors, 47 per cent.

The "Big Five" among the buyers of American merchandise—the United Kingdom, Canada, Germany, Japan and France—purchased more than one-half of all American exports during the first quarter. Sales to Canada, Germany and France in the first quarter were greater than a year ago, while those to the United Kingdom and Japan fell off.

Sales and Distribution Plan Presented to Manufacturers and Jobbers

Co-operative scheme of Bolt Association rouses interest

ENTHUSIASM marked the sessions of the National Distribution Conference called by the Bolt, Nut and Rivet Manufacturers' Association at the Waldorf-Astoria Hotel, New York City, June 28-29. About two hundred and fifty representatives of manufacturers and jobbers attended the conference, among whom were executives of all kinds of manufacturing companies, mostly metal-working, outside the bolt and nut field. After the co-operative plan of sales and distribution now used by the bolt manufacturers was explained, two committees were selected, one of manufacturers, the other of jobbers, to study the application of similar plans to other lines of manufacturing and distribution.

The members of the two committees will have about two months to confer with their respective industries and sections. A conference will then be called in Washington to perfect the organization and to ask approval of the plan from the Federal Trade Commission. The plan will be designed to benefit the whole industry, labor and the ultimate consumer.

The keynote speech of the convention was made by Charles J. Graham, president of the Bolt, Nut and Rivet Manufacturers' Association. Mr. Graham dwelt on the fact that the big problem now before American business is that of sales and distribution, and that the object of the meeting was to study sales and distribution and try to aid in bringing about a remedy for the present state of profitless prosperity. In part, Mr. Graham spoke as follows:

C. J. Graham's Speech

"The bolt, nut and rivet industry found itself in such a demoralized condition in 1924 that it was forced to take action to save itself from complete destruction. Its losses were running into such figures that within a short time, unless some steps were taken, only a few of the strongest companies would have been able to survive. In 1924, the losses of the bolt, nut and rivet industry on a gross business of $75,000,000 reached a total of $12,000,000 approximately.

"Our own company decided in July of that year that such a policy was suicide, and without consulting any of our competitors, made a statement to the trade and to our competitors that from then on we would get at least cost out of our products or quit business entirely. Our company advanced prices 35 per cent, and for the first time in our history established a definite sales policy on price, to be maintained regardless of competition. As a result of our action, such an interest was exhibited by a number of our leading competitors that the executives of seven of them were invited to Pittsburgh for a conference. This created a great interest within the industry as a whole, and resulted in an invitation being extended to all companies to a conference, which was held in Pittsburgh in the fall of 1924.

Results of Experiment

"This resulted in a movement which was such a complete change that for the next three years our industry operated at a profit of $6,000,000 per year, instead of a loss of $12,000,000. But when you consider that we have a capital investment of about $150,000,000, it is evident that we are still a long way from the result which is essential if we are to maintain our plants at the point of highest efficiency.

"We organized our present association in April, 1925. An executive committee was appointed, which made a complete study of the causes which have brought us into the demoralized condition. The first study made was on cost accounting, and after a year a cost system was devised and made available to all the plants in our industry. While all companies have not adopted this system, more attention is now given to the question of costs than ever before.

"Our basic list, from which our discounts apply, was prepared as a result of a scientific study and is based on actual manufacturing cost. By using this list, every company with modern equipment should be able to make a fair return on each unit of equipment operated.

"Our investigation as to the causes of the contributor's attitude showed that we were entirely responsible for it. In our struggle to secure orders to run our plant to capacity, we had practically lost sight of the distributor. We had become his most aggressive competitor and were soliciting trade which by virtue of his facilities and location he could handle in a much more satisfactory and economical way than we could. To overcome this attitude, we decided to try an experiment in the Pittsburgh district.

"We requested the jobbers to furnish us a list of all of their customers in our line. Our committee studied this list of 11,000 accounts and finally selected 275 names on the list on which we made the start of our experiment. We now say to the distributor that owing to the fact that the soliciting and handling of what might be termed the smaller run of orders is too expensive for us, we as manufacturers will only solicit business from the 275 accounts in this territory, and will do everything in our power to have the balance of this trade flow through its proper channels. We cannot legally, and do not refuse to sell to the trade not appearing on this list. But we give the jobber this assurance, that on such inquiries or orders, we will each determine for ourselves as to what the jobber's resale price is out of the warehouse stocks in the territory, and will have regard for that situation. This proposition has worked out so satisfactorily to both parties in the Pittsburgh district that we determined to make it nationwide in scope.

Committee Plan

"We then appointed a committee of manufacturers, who subsequently met with the jobbers committee to determine who the large buyers were in that particular territory and to follow exactly the same procedure after the list was created that we followed in Pittsburgh. We now have 34 such committees in operation in the United States.

"The result has been that the distributor's attitude has changed from one of antagonism to one of willingness to support a stable market, and to be willing and anxious to pay a stable price.

"If all of the manufacturing industries in the country would analyze their selling cost, they would find that about 80 per cent of their sales expense is producing less than 20 per cent of their volume. The two great evils in American business as it exists today that must be eradicated if we are to succeed in our efforts to continue our prosperity are price cutting and selfishness. The price cutter is the enemy of all mankind. Selfishness is the underlying evil of all of our business troubles and, of course, selfishness is responsible for the price cutter. Our industry has eliminated selfishness to a marked degree."

Following Mr. Graham, Mr. Schwab, president of the Bethlehem Steel Co.,

spoke to the convention and brought out the point that his company in four years time had spent eighty millions of dollars for improvements and economies and in this time had effected a reduction of $7 a ton in the price of steel. But in the meantime the selling price of steel had been forced down $8 a ton due to competitive conditions. The industry, therefore, was in no better condition as far as profits were concerned than it was before the manufacturing economies had been effected. He stated that this same state of affairs is true of most companies today. He believed that the engineers have done a good job from the manufacturing end, but that the time has now come for the sales and distributing ends to improve their methods. Mr. Schwab favored the modification of the present Sherman Law to permit manufacturers to get together in a more intimate way to help for better distribution.

Magnus W. Alexander, president of the National Industrial Conference Board, and one of the speakers at the dinner on June 28, gave an address, "Production, Distribution, and Social Progress." He described the evolution of the United States from an agricultural to an industrial nation, pointing out that the extent and rapidity of the evolution have been unequaled and attributing the success of this growth to the fact that most of it took place in connection with a seller's market, with the consequence that production was the chief objective and that distribution problems were relatively unimportant. He explained that much of our present overcapacity is due to the great production efficiency achieved during the World War and that production efficiency has set a pace that may easily outstrip the capacity of domestic consumption.

Marketing Problems

According to the reasoning of Mr. Alexander, the problems of distribution include those of transportation, handling and marketing, but they also include the necessity for proper planning of production. In other words, the manufacturer must examine his markets and market capacities and produce only what can be absorbed. His suggestion is an argument against profitless production merely for the sake of turning out large quantities. He suggested, also, the localizing of distribution by establishing more warehouses, in line with the recent policy of Montgomery, Ward & Co., and the selling of manufactured products to jobbers acquainted with local conditions.

Hon. James Francis Burke, general counsel, Bolt, Nut and Rivet Manufacturers' Association, also spoke at the dinner. His subject was "The Era of Efficiency," and in substance his remarks constituted a plea for the recognition of the economic necessity for adequate combinations of capital and ability.

Both Thursday afternoon and Friday forenoon were devoted to discussions in which both jobbers and manufacturers were well represented. As a result of these conferences two committees were appointed, one for manufacturers, and one for jobbers. The plan is that each of these committeemen will call a meeting of his industry, or section, at which meeting permanent committees in each will be appointed. This will be followed by a conference with the Federal Trade Commission.

The Manufacturers' Committee consists of Charles J. Graham, president, Bolt, Nut, and Rivet Manufacturers' Association, chairman, and representing bolt, nut, and rivet industry; George E. Watson, vice-president and general sales manager, Wickwire-Spencer Steel Co., Inc., representing wire-cloth industry; H. E. Haiman, General Wheelbarrow Co., representing wheelbarrow industry; James R. White, secretary, Jenkins Brothers, representing valve and packing industry; H. E. Penfield, Chicago Screw Co., representing cap and set screw industry; J. S. McDaniel, secretary, Cordage Institute, representing cordage industry; William McGregor, Carborundum Co., chairman, merchandising committee of the Abrasive Paper and Cloth Manufacturers' Exchange, representing abrasive industry; Frank A. Bond, vice-president, United States Chain & Forging Co., representing welded-chain industry; Charles H. Meigs, commissioner of Fire Extinguisher Institute, representing fire extinguisher industry; E. L. Parker, president, Edgar T. Ward & Sons Co., representing cold-finished steel industry; C. L. Butts, manager of sales, Wood Shovel & Tool Co., representing shovel industry; Ross R. Harrison, general manager, Bryden Neverslip Co., representing horseshoe and calk manufacturers; Geo. W. Jones, general sales manager, Pittsburgh Steel Co., representing nail and wire industry; Wm. G. Hume, vice-president and sales manager, Keystone Steel & Wire Co., representing fence and poultry wire industry; W. E. Sprackling, president, Tubular Woven Fabric Co., representing the electrical goods industry; Wm. E. Cross, Clemson Bros., representing hacksaw and saw industry; F. R. Plumb, F. R. Plumb, Inc., and S. Horace Disston, Henry Disston & Sons, Inc., both representing hand tools.

On the Jobbers Committee are: W. W. French, Birmingham, Alabama; H. L. Gray, St. Louis, Mo.; H. W. Caldwell, Chicago, Ill.; W. E. Hansen, New York City; George Puchta, Cincinnati, Ohio; R. H. Welton, Boston, Mass.; Alvin M. Smith, Richmond, Va.; Henry Morris, San Francisco, Calif.; P. R. Helm, Phoenix, Ariz.; H. B. Waterman, Denver, Colo.; F. Sargent, Philadelphia, Pa.; H. H. Riddle, Cleveland, Ohio.

Quebec Draws Large S.A.E. Summer Meeting

QUEBEC, in spite of its distance, proved a popular place for the summer meeting of the Society of Automotive Engineers which was held at Chateau Frontenac, June 26 to 29 inclusive, well over a thousand being in attendance. The attractiveness of the city did not, however, add to the attendance at the sessions.

The Standards Committees from nine divisions met and discussed their problems the first afternoon, and at the semi-annual business session, in addition to the president's address, the meeting heard Maj. E. G. E. Beaumont, president of the Institution of Automobile Engineers of England, Norman Shidle and saw Baron Shilo's high-speed motion pictures. Mr. Shidle's topic was "The Engineer As a Business Man," in which he made many pertinent points of value to engineers in general. Among them were the necessity of being able to sell his ideas to management, that the vagaries of the men with whom he must contact are as much his problem as mechanical difficulties, and he must not expect authority to be given him; he must earn it. The paper brought out much lively discussion and was a real contribution to the session.

Papers at the chassis session were devoted to "Legislation on Automobile Brakes" by Prof. E. H. Lockwood and H. W. Best; "European Roads and American Cars" by Tore Franzen; and "Methods of Obtaining Greater Power from a Given Engine" by T. J. Little, Jr. who stated that the demand for increased car-performance had forced manufacturers to provide more power for engines.

In his paper on "Ground Gears and Transmission Design," H. F. L. Orcutt advocated ground teeth for transmission gears because they can be made to the same degree of accuracy as the other fine working-parts of a motor-car. He holds the designing engineer responsible for conditions unfavorable to the adoption of gear grinding by the production department and believes that cluster gears should be avoided because it is impossible to finish them accurately.

Fundamental principles of rigid shafts and correct bearing arrangements were laid down in his paper and the degree of accuracy specified for the fitting parts. Transmission-case design still needs development and study to avoid resonance. Designs were recommended that will provide ample center distance to avoid pinions with a small number of teeth. The unmodified involute is recommended as the most satisfactory form of tooth.

Spigot bearings received special consideration. Two designs of transmission were submitted, in one of which the spigot bearing is eliminated. Simplification is sought by reducing the number of gear sizes used and it is stated that four-speed transmissions require gears with only four different numbers of teeth.

(Continued on page 36h)

The Business Barometer

The outlook in Commerce, Finance, Agriculture and Industry

By THEODORE H. PRICE

Editor, Commerce and Finance, New York

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WHILE Secretary Hoover was being nominated in Kansas City nearly all the markets were weak or hesitant, and while Governor Smith was being nominated in Houston most of them were strong. As the markets are certainly no more Democratic than they are Republican some other than political explanation of their behavior must be sought.

To the psychologist, all behavior falls into either the conscious or the unconscious, with the unconscious behavior considered the better guide. The unconscious habit of the nation is to work, to produce, to trade, to buy and sell and consume. When this is interfered with by the power of conditions compelling conscious attention, business is interrupted.

Thus, for a long time the perilous altitude of the stock market commanded the attention and the normal conduct of business was inhibited. Then the thrusting of the Presidential campaign into the forefront by the meeting of the National conventions emphasized the political uncertainties which traditionally affect the business mind. When the Kansas City convention met these distractions were at their height. But they have since been modified by drastic house cleaning in the stock market and by the fact that the Houston convention was really over before it met, with the nomination of Governor Smith assured.

Since then a notable improvement in the markets and in the tone of business has been apparent, and now that the Democratic convention is over in fact there is no reason why the normal impulse to keep business active should not actuate everyone at least until the campaign or some other new development brings another distraction.

I am the more disposed to think this a correct analysis because each of two business leaders who were moved to give out reassuring statements during the past week emphasized one of these points. Otto H. Kahn said that the setback in stocks had gone a long way toward the establishment of more normal conceptions and that with the extremes and excesses of the bull market ended, stock prices would hereafter more actually portray existing conditions and values and industrial and financial progress would be more closely attuned. And John J. Raskob, assuring business that it need fear nothing from Governor Smith, said that there is no occasion for timidity in Presidential campaigns; "business has grown too big for that." With these statements there can be no disagreement though it would be a mistake to interpret Mr. Kahn's words as a prediction that the stock market decline has run its course, for it is unlikely on the face of it that the speculative accumulations of four years of feverishly rising prices can be liquidated in the course of a single sharp decline.

But with the state of business, considering the season, only the ultra-fastidious can find fault. The level at which automobile production and sales are being maintained confounds all the prophets but the optimists, for the larger companies with only two or three exceptions continue to make and sell more cars than they did at this time last year and the gradual increase in Ford production fills the gap left by the few which are slumping. The fact that building has been remarkably sustained and has made new high records thus far this year has doubtless reached all eyes and ears by now. And the third of the "Big Three" industries—iron and steel—is giving ground but slowly to the seasonal downward trend.

The favorite index of the movement of goods, railway car loadings, continues to run slightly below the corresponding period of 1927; the decline is almost entirely in coal, and as its lessened consumption is offset by the increase in the industrial use of oil and electric power it signifies no reduction in the output of manufactured goods. And while the shift to other fuels butters no bread for the railroads they are saving more out of their reduced gross earnings, and those which have thus far reported for May show an increase of more than 3 per cent in their net. Declining stocks of coal suggest that mining operations may soon increase, and the reports of the various Shippers' Advisory Boards which have recently held their meetings invariably predict a movement of commodities in the second half year greater than in the same period of 1927.

Though dear money and the Federal Reserve policy of contracting credit seem to have discouraged business much less than they have stock market speculation, there is cause for satisfaction in the possibility of lower rates which looms up, though for the remote rather than the immediate future. Belief that easier money is probable is founded upon two premises. One is that the Reserve Banks, after they feel that their policy has effectively accomplished its purpose, will then reverse it, buying, instead of selling government securities, in time to make funds more abundant for the crop movement. And the other is that gold exports are not likely to exceed imports much longer.

Therefore no check to the resumption of business after the seasonal recession runs its course is in sight unless we allow ourselves to be distracted by politics or depressed by a renewal of the stock market decline.

WHAT'S DOING IN INDUSTRY

CONDITIONS in the machine tool market were spotty in several centers during the month of June. In New England there was a slight decline from the volume of orders placed in May, but industry in general was well occupied, and some of the tool builders were running double shifts. Orders for such equipment were also spotty in the Milwaukee district, but inquiries were in good volume. In Buffalo conditions are better than anticipated for the early summer. Business in May and June was very satisfactory after a dull period of many months.

A NOTE of expectancy features the New York market, where many dealers are waiting upon the demands of a few concerns, notably the General Electric Co. and the Wright Aeronautical Corporation. Sales were very satisfactory for manufacturers in the Cincinnati district, although agents reported a slight drop. A large number of inquiries are out, but a hesitancy in placing orders has been evident for some time. Inquiries are also holding up well in Philadelphia.

DETROIT reports a dull period in the past fortnight due to a curtailment of purchasing by the automotive companies, and in Milwaukee, also, buying from this source has slowed up. In Cleveland, however, business has picked up in the same period, largely due to purchases from automobile plants, particularly for automatic turning machines. This class of machinery is also selling well in New England. Automotive buying is also holding up the Philadelphia market.

RAILROAD buying is still very quiet in many centers, such as Philadelphia and New York, but is picking up in the South and in New England. In Milwaukee, it is fair.

The Industrial Review

Weekly progress of the machinery and machine tool business

THE following reports, gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

MILWAUKEE

The demand for metalworking equipment is beginning to show somewhat more spotty characteristics, and there has been some let-down in the volume of new orders. On the other hand, inquiry is equally as active as before, and some makers report even more interest on the part of prospective buyers. While orders are being placed slowly, the tone of inquiries is making the outlook promising. It is expected that orders for machinery and special tools that require a considerable longer time to produce than standard types will be placed in the near future, so that delivery may be made in time to give users the benefit of such equipment when it becomes needed next fall.

Automobile plants as a rule are doing little buying save for urgent replacement needs. The new-model season of certain of the larger manufacturers is at hand, and the reception of the new cars by the public during the next thirty to sixty days doubtless will be a yardstick by which will be determined the purchases of production equipment against needs for the remainder of the year.

Tractor concerns remain a relatively important factor in current buying. Makers of aircraft engines, far behind on orders and facing the greatest demand in history, are becoming good customers. General industrialists are inclined to mark time, awaiting developments.

Railroad demand is only fair. Locally, prospects have brightened with the announcement of the possibility that the Chicago, Milwaukee, St. Paul & Pacific R.R. will enlarge its West Milwaukee shops at a cost of $1,000,000, with a view of concentrating all of its new passenger and freight car construction at this point. The shops now are the largest of the entire Milwaukee system, and besides the building of new cars and coaches, locomotives are serviced and rebuilt here.

NEW ENGLAND

Information available from representative dealers and manufacturers in the machinery and machine tool field is altogether indicative that a spotty market was experienced through the month of June. Final figures for the month will not equal May totals it is estimated, but declines in most cases will be comparatively small. Industry as a whole, however, was steadily occupied in the New England section with no disastrous declines in any one line.

Some manufacturers of machine tools booked as many orders in June as in any month of the year. Dealers in used machinery have been favored by a more general demand from diversified industries requiring replacement units. Grinding machines, presses and small automatics continue to sell at a high level. The New Britain Machine Co. is operating with day and night shifts, as is the Goss & DeLeeuw Machine Co., at Kensington. The latter company plans to increase its capital to take care of plant expansions. The New Departure Manufacturing Co., of Bristol, is also operating departments overtime. For some time the Pratt & Whitney Aircraft Co. has been well occupied and is now increasing its production to take care of recent orders.

Action is expected in a short time on machine tool lists representing New England railroad requirements. The Boston Schoolhouse Department inquiries now number three lists of some fifty tools. A Holyoke wire manufacturer is expected to be in the market for new equipment. In western Connecticut a new enterprise financed to the extent of $500,000 will take new equipment to manufacturé products, principally for the aeronautical field.

BUFFALO

Conditions in the machine tool trade, considering the fact that the vacation season is just beginning, are much better than usual at this time of the year. May and June have in some respects been a happy surprise to many dealers. There are a few who report business off, but the real slump, if it comes this summer, is not now expected to appear for a few weeks. Inquiries continue fairly good. Activity in the aircraft industry is reflected in equipment sales.

Business in the electrical equipment field lags behind the machine tool field even more than has been the case in earlier months of the year. Orders are small but have been reasonably plentiful until the last fortnight.

The demand for contractors' equipment is not so heavy as it was in May or the first half of June.

CINCINNATI

The great majority of the machine tool manufacturers in the Cincinnati district report that in the past week sales were at a level that may be termed better than fair, if the adverse influence of the nearness of the Fourth of July holiday is taken into consideration. A number of manufacturers state that there was some increase in sales, comparing it to the previous week, and none report a diminished volume of business.

Selling agents report that while their business dropped a little below the level of the previous week, their bookings were large enough to be regarded as satisfactory for this time of the year.

The sustaining feature of the week's market was the purchase of single tools by miscellaneous users and general machinists in all sections of the country. Automobile manufacturers bought more than in the previous week, the great majority of their orders being confined to single orders for small-size equipment. Railroad orders reported also were confined to single items.

A large number of inquiries were received from miscellaneous users in the week. The general market, it is stated, is in about the same condition as it was at the end of the first six months of last year, when there were a large amount of single sales pending, and when it seemed impossible to overcome sales resistance in a reasonable amount of time.

DETROIT

The dull period in the machinery trade that set in two weeks ago has not abated, and it seems likely that business in Detroit will be very quiet for nearly the entire summer. Many of the automobile plants have closed for their vacation periods and others are planning to do the same thing.

At the present moment there are few signs of activity. Many of the large automotive plants are planning big developments in the fall, and while rumors of changes in design are current, no authentic statements have been made.

Employment remains stable, and is even increasing. The general level of prosperity of the city and the state is very high and it seems likely that it will continue so.

The big hope of the machinery and machine tool dealers here is still Henry Ford. It is generally believed that he will do a great deal of buying between now and this time next year. He is still farming out a great deal of work and it will be necessary for him to install a large amount of equipment to take care of his own production needs. He is gradually increasing his production now, but mostly through outside work it seems.

PHILADELPHIA

Business in machinery and machine tool lines kept up fairly well during the month of June in the Philadelphia market, with automobile manufacturers, general industrial lines and steel companies being purchasers.

Dealers in abrasives reported some orders from the automobile centers, and smelting concerns reported that the recent rise in the price of copper had been a boon to their business. Inquiries have come from general industrial lines to the producers of bevel gears, and dealers in gears generally reported a fairly good market with purchases from paper and pulp mills. Some improvement in the tone of business in that line was noted by the leading producers.

While most of the dealers and producers are looking to automobile centers for their business, and apparently with some justification, the producers of heavy machinery for railroads do not see much chance for improvement in their lines. There has been but little headway made by the carriers toward buying, dealers reported.

NEW YORK

Machine tool business in the New York market is still holding up well and no letup is expected during the summer months. Orders placed during June on the average equalled in volume those of other months, and for one leading dealer exceeded those of previous months this year, all of which had been at a good average level. The half year as a whole has shown a decided improvement over the last six months of 1927, and the trade enters the second half of this year with considerable optimism.

As has been reported for some weeks, two buyers continue to dominate the market —the General Electric Co. and the Wright Aeronautical Corporation. In the past week the former company has purchased some presses among other equipment, and orders for turret lathes are expected to be issued shortly. At the present writing, July 2, no business of any account had been placed by the Wright company in the past week, except one Sundstrand stub lathe and some engine lathes. Inquiries have been out for some weeks on a large list of tools on which action is expected during the first week of July. This equipment includes sensitive drills, milling machines, drill presses, engine and turrent lathes, grinding machines and general tools, and is for use in the five-story addition expected to be completed within the next six weeks. Production at present has reached a maximum of 130 engines a month, with an ultimate goal of 550-600 a month, it is said. It is understood that the list of equipment necessary to produce this number makes very nice reading. In fact, contemplated Wright purchases so dominate the local market

that each day sees another factory man arriving in town to help push the sales of his local agent.

Scattered business from other sources is giving most dealers and factory representatives a fair volume of orders. Among the machines sold were two Cincinnati press brakes, one Carlton radial drill, two 26-in. Libby turret lathes (rebuilt), one 72-in. used boring mill, a Watson-Stillman vertical and horizontal hydraulic press, and a Swiss jig borer, the last to a concern in Connecticut. Milling machines have found a good market for the past six months, and lathe sales have held up well in a very competitive field. Railroad buying has been disappointingly slow for some time. The New York Central has been holding off the purchase of a wheel lathe, as has the Erie an axle lathe. A concern handling this line reports, however, that sales of this equipment to other centers have been steadily rising. In the last month the market has shifted from Chicago to the South and New England.

Sales made by the Pratt & Whitney Co. included a profiler, a 6-in. vertical shaper, two turret lathes, an 8-in. rotary surface grinder, three 10-in. thread millers, a No. 2 die sinker and twelve lathes ranging in size from 13 to 20 in. The Niles Tool Works Co. sold a 10-16-ft. boring mill, a 5-ft. Right Line radial drill and a 90-in. locomotive wheel lathe, the last to the Santa Fe.

CLEVELAND

Business in the machinery and machine tool lines has livened up during the last half of June. The depressed feeling that was so prominent around the first part of June is slowly disappearing and a more favorable aspect is taking its place. Orders for small pieces are coming in fair quantity from all classes of machine tool users. A few industrialists have out some big lists, but they are slow in closing, leaving the impression that better business is ahead. Increased activity of the automobile industry of Detroit has resulted in several big orders from this source. General Motors ordered a list of fifteen tools. Ford purchases are also reported.

The automatic line is the brightest spot in the local market and is enjoying its best business at the present time. Sales in the month of June will be the biggest this year, it is anticipated. Sales for the first half of the year have tripled that of last year. Orders received during June have ranged from eight to fifteen tools. The automobile industry is the biggest contributor. Production has been increased and a night shift is necessary. Turret lathe, planer and punch and shear manufacturers report business as satisfactory.

CHICAGO

The last days of June find the machine tool situation in satisfactory shape. Reports from manufacturers' agents and local dealers agree that the business of the month has been well maintained as compared with the months preceding. In some lines of manufacture it has gone considerably ahead, one concern, the output of whose plant is mainly limited to drilling machines, stating that its business for June has shown a gain over that of any similar period for more than a year.

The principal demand for machine tools still comes from farm machinery and tractor plants, though this demand is now slackening, most of their shop necessities having been filled. Special machinery is being designed on a more than ordinary extensive scale by Chicago engineering concerns to meet manufacturing problems of some of the tractor plants that cannot be solved by the use of standard machinery.

Railroads are buying but sparsely, single tools and small lots seemingly meeting their present needs. The Santa Fe is reported to have bought against practically all the items contained in its lists.

The Cicero (Ill.) Board of Education has been getting prices on a few tools for its technical school, and the Chicago Board of Education has recently ordered some of the equipment for which it has been inquiring. Demand for used tools has improved.

S.A.E. Meeting at Quebec

(*Continued from page 36c*)

In a paper on the "Simultaneous Inspection and Correction of Gears in Production," Charles H. Logue and R. B. Fehr described how spur and helical gears are corrected to give a high degree of uniformity in spacing and profile so that the gears become practically interchangeable. They acquire a "crown face" which enables them to run with unusual quietness under practical conditions. This is essentially an inspection-correction process, as it automatically finds and eliminates the errors.

The lap is the important item in the process. It is of chilled cast iron, gray cast iron, or type metal, and is made by casting in a mold around a steel chill cut to approximate the gear to be corrected but has a face-width several times that of the gear. The lap, when completed, looks like a wide-faced internal gear.

The gear-correcting machine is of relatively simple construction and performs three main functions: (a) it provides reciprocating motion for the gear; (b) it causes mutual pressure between the faces of the gear teeth and the lap; (c) and it advances the gear one tooth with respect to the lap at the completion of every cycle so as to assure uniformity of spacing and contour.

The authors assert that the device will do this work without adding to the total cost of gears, for the feeds of gear-cutting machines can be increased to compensate for the time required by the gear-correcting operation. The resultant gears will be interchangeable and will eliminate virtually all matching-up, as well as rejection in the final tests.

At the foreign session A. M. Narraway spoke of the "Airplane in Canadian Exploration" and Maurice Platt of *The Motor*, London, told of the "Trend in European Passenger Car Design."

"A New Electrical Engine Indicator" by Dr. E. J. Martin and D. F. Caris, "Poppet Valve Spring Design" by Alfred Moorhouse and W. R. Griswold, "Fuel Supply to Engine and Future Development and Crankshaft Distortion Research" by C. A. Norman were discussed at the engine session.

Two very interesting papers were presented at the transmission session, "Wheel Drives" by Herbert Chase, and "Automatic Transmission" by D. Sensaud de Lavaud.

Discussion on Chromium Plating

Discussions on chromium plating featured the sixteenth annual meeting of the American Electroplaters Society,held in Toronto on June 28-29. This phase of the subject was dealt with by Oliver J. Sizelove, Newark; B. F. Lewis, Detroit; V. Van Derau, Westinghouse Electro-Products, Mansfield, O., and S. T. Lunbeck, Philadelphia. Other speakers on the program were David Ayers, Toronto; F. C. Mesle, Oneida, N. Y.; W. E. Hughes, England; W. W. Patrick, New York; James Welsby, Dartmouth, N. S.; Dr. A. K. Graham, Matawan, N. J., and Kenneth E. Burgess, Stamford, Connecticut.

The program included addresses and papers by William Schneider, Brooklyn; Dr. William Blum, Bureau of Standards, Washington; Joseph Tristka, New York; Harold Work, Aluminum Co. of America; Dr. J. T. Burt-Gerrans and Prof. W. H. Price, both of the University of Toronto; F. J. Liscomb, Chicago; Walter J. Allen, Grand Rapids; J. Van Straatten, Philadelphia; W. P. Barrows, Washington; Dr. J. G. Cunningham, Toronto; Leo Roon, Long Island City, N. Y., and Thomas Gardner, New York City.

Thread and Gauge Commissions at Rochester

The National Screw and Thread Commission and the American Gauge and Design Commission visited Rochester on June 22-23 to investigate the methods and tools used in some of the larger industrial establishments of the city. Plants of the Taylor Instrument Co., the Bausch & Lomb Optical Co. and the Eastman Kodak Co. were visited.

Among those in the party were Dr. George K. Burgess, director of the Bureau of Standards; Com. Harry Hurd and Lt.-Com. Don Moon, of the U. S. Navy; Col. John Johnson and Col. Eugene Peck, of the U. S. Army; Henry Bearce, recording secretary of the Bureau of Standards; and Earl Buckingham, of the Massachusetts Institute of Technology.

James Ely, vice-president of the Taylor Instrument Co., presided at a dinner on the 22nd. Carl Bausch of the Bausch & Lomb Co., James Gleason, president of the Gleason Works, and A. Edwin Crockett, manager of the Industrial Management Council of the Chamber of Commerce were among those at the dinner. Dean Dexter Kimball, of Cornell University, gave an address.

Pennsylvania R.R. to Scrap All Wooden Cars

The delivery of 629 all-steel cars to the Pennsylvania Railroad Co. will be completed by the end of the present year, according to announcement made by the company on June 27. As soon as the new cars are placed in service, all of the old wooden cars will be scrapped, officials announced, adding that the Pennsylvania will be the first carrier in the country to go on a 100 per cent all-steel basis under orders from the Interstate Commerce Commission.

The cost of the new equipment is placed at $15,000,000. The cars are under construction by the leading equipment companies of the country. These

orders include 300 standard all-steel 70-ft. passenger coaches, 210 standard 70-ft. combined passenger and baggage cars, 45 theatrical scenery cars, 29 all-steel gas-electric rail cars, and 25 horse express cars.

Metal Exchange to Be Supplanted

A new Metal Exchange with a clearing house to trade in metal spots and futures was organized officially yesterday, the members of the old New York Metal Exchange voting unanimously to dissolve that institution and join the new one. It was decided to continue operation of the old body, which has been in existence since 1883, until the new exchange functions in the fall.

A.S.M.E. Holds Aeronautic Meeting in Detroit

Sessions on transport, light-weight woods, power plants, wing design, airways and airships, and military aviation were featured at the summer meeting of the Aeronautic Division of the American Society of Mechanical Engineers, held in Detroit, June 28-29. The meeting tied in with the fourth National Air Tour, starting from the Ford Airport on Saturday, June 30, and the Gordon Bennett International Balloon Races. The Fairchild-Caminez engine was explained by Harold Caminez at the power plant session. The chief paper at the wing design session was that by F. Hanley Page, of London, on his automatic wing slot.

Gisholt Host to Foremen's Club

On June 23, the Chicago Superintendents and Foremen's Club of the National Metal Trades Association were guests of the Gisholt Machine Tool Co., of Madison, Wis. The group numbered about 250 and came by special train. After an inspection of the Gisholt plant, the group went by bus to the Madison-Kipp plant where they watched the manufacture of a die-casting machine and force-feed lubricators. Short speeches were given by Gisholt men after a luncheon at a roadside inn.

Agricultural Machinery Activity

According to the Standard Statistics Co., the farm implement industry, which established a new sales record in the last half of 1927, is promised an unusually active fall sales season. Sales of heavy, powered equipment of the labor-saving type, such as threshers and tractors, are running very large this year. Although profit margins have been somewhat narrowed by price reductions in some lines, augmented sales in most cases are resulting in improved earnings. The industry as a whole is at present one of the most prosperous in the entire country.

Business Items

The Cogsdill Manufacturing Co., of Detroit, Mich., is now building a modern fireproof addition to be used for a stock room. The company makes metal-cutting tools.

The Davis Tool & Equipment Co., Inc., 724 W. Washington Blvd., Chicago, Ill., has been appointed Chicago distributors for the Ampco Twist Drill Co., of Jackson, Mich.

The Edgar Allen Steel Co., Inc., has changed its New York address to 741 Washington St., and its Chicago address to 21 N. May Street.

The Bausch Machine Tool Co., of Springfield, Mass., has filed suit against the Aluminum Co. of America and four officials, charging conspiracy to create an aluminum monopoly. A judgement of $9,000,000 is asked.

The Vergan-Schmidt Engineers, of Dubuque, Iowa, and Champaign, Ill., have moved to Chicago with L. J. Brainard & Son, 2036 Dominick St., so that the latter may manufacture the Tract-O-Crane for them.

The Metal Products Manufacturing Co., of Minneapolis, Minn., has changed its name to the Thiem Manufacturing Co. The company makes metal specialties and will continue with the same personnel.

The Johnson Motor Co., of Waukegan, Ill., manufacturers of outboard motors, has incorporated the Canadian Johnson Motors Co., Ltd., to be located at Peterboro, Ontario. The company has leased a modern plant of approximately 330,000 sq.ft. and is starting the asembling of motors.

Following the recent purchase of the Chisholm-Moore Manufacturing Co., Cleveland, by the Columbus McKinnon Chain Co., Tonawanda, N. Y., the former company will hereafter be known as Chisholm-Moore Hoist Corporation (Division of Columbus McKinnon Chain Co.) The officers are: Julius F. Stone, president; Julius F. Stone, Jr., vice-president; J. C. Dunn, vice-president and treasurer; Frederick Mitchell, secretary. John R. Mears continues as sales manager of the new corporation.

The Aeronautical Products Corporation, Naugatuck, Conn., has been incorporated with a capital of $500,000 to manufacture airplane engines and parts for motor vehicles, boats, dirigibles and airplanes. The incorporators are Benedict M. Holden, T. J. Birmingham and Helen L. Hancock. The officials of the company will be Harris Whittemore and Mr. Johnson of the Johnson Motor Products Co., Naugatuck. Mr. Johnson has invented an airplane engine for which sizeable orders are already booked.

Personals

WILLIAM H. GERHAUSER, formerly vice-president and secretary, has been elected president of the American Shipbuilding Co., of Cleveland.

G. E. SMART, chief of car equipment of the Canadian National Railways, Montreal, was re-elected chairman of the Mechanical Division of the American Railway Association at a recent session at Atlantic City.

RAYMOND O. ABBOTT has been elected president and treasurer of the National Pipe Bending Co., New Haven, Conn., succeeding the late H. S. Brown. Mr. Abbott had been secretary and treasurer for three years.

GEORGE J. LYNCH has been appointed district manager of sales for the Chicago Pneumatic Tool Co. of New York, at 1931 Washington Ave., St. Louis, Mo. Mr. Lynch was formerly assistant district manager in the New York office.

JUDGE OMAR W. PLATT, who only a short time ago was elected president of the Aircraft Corporation of America, Milford, Conn., has resigned his office as president-director, because of the pressure of other business.

FRANCIS A. EMMONS, sales and advertising manager of Foote Bros. Gear & Machine Co. of Chicago, was elected president of the Engineering Advertisers Association of Chicago, at the annual meeting of the association held recently.

MAURICE A. OUDIN, vice-president of the International General Electric Co., Inc., was decorated with the Order of Commander of the Crown of Italy, in recognition of his good offices in behalf of a closer international relationship and of the specific benefit to the engineering profession of Italy.

HENRY GARDNER, formerly consulting engineer with the Steamotor Co., of Chicago, has become associated with the Comtor Co., Waltham, Mass., as vice-president and treasurer. Mr. Gardner has had a wide engineering and executive experience. For a number of years he held the position of special mechanical engineer on the Baltimore & Ohio railroad.

Obituaries

SIR J. THORNYCROFT, noted naval architect and engineer, died in London on June 29 at the age of 85. He was the inventor of a small marine boiler for yachts.

SAMUEL RALPH JONES, a director of the E. D. Jones & Sons Co., Pittsfield, Mass., manufacturers of paper-making machinery, died June 21 at his home in Pittsfield.

ELMER J. REMENSNYDER, assistant purchasing agent of the Pennsylvania R.R. Co., died on June 27 at the age of 44. He had been with the Pennsylvania since 1901.

COL. CHARLES CLIFTON, chairman of the board, Pierce-Arrow Motor Car Co., died on June 21 in his 75th year. He had been chairman since 1919. When the National Automobile Chamber of Commerce was formed in 1904, Mr. Clifton became first president and held that position until March, 1927, when he resigned to become honorary president and director.

Forthcoming Meetings

Canada's Steel and Power Show. Second annual show to be held at the University of Toronto Arena, Sept. 4-7. Secretary, Campbell Bradshaw, 24 Front St., Toronto, Ontario.

American Railway Tool Foremen's Association. Annual meeting, Hotel Sherman, Chicago, Sept. 12, 13 and 14. G. G. Macina, secretary, 11402 Calumet Ave., Chicago.

American Railway Tool Foreman's Association. Sixteenth annual convention of the Supply Association, Hotel Sherman, Chicago, Sept. 12, 13 and 14. F. A. Armstrong, secretary, the Pratt & Whitney Co., 564 W. Monroe St., Chicago.

National Safety Council. Seventeenth annual safety congress will be held in New York, October 1-5. Idabelle Stevenson, executive secretary, 1 Park Ave., New York.

American Society for Steel Treating. "National Metals Exposition," Commercial Museum, Philadelphia, Pa., week of Oct. 8. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

American Welding Society. Fall meeting and exposition, Exhibition Hall of Commercial Museum, Philadelphia, Pa., Oct. 8-12, in conjunction with "National Metals Exposition" of the American Society for Steel Treating. Miss M. M. Kelly, secretary, 29 West 39th St., New York City.

American Gear Manufacturers Association. Semi-annual meeting, Statler Hotel, Buffalo, N. Y., Oct. 11-13. T. W. Owen, secretary, 3608 Euclid Ave., Cleveland, Ohio.

American Management Association. Autumn convention, Palmer House, Chicago, Nov. 13-15. W. J. Donald, managing director, 20 Vesey St., New York City.

The Weekly Price Guide

Rise and Fall of the Market

WITH the exception of zinc sheets, fabricated brass and copper, price changes of the week were downward. Declines occurred in steel sheets, tin, solder, babbitt metal and non-ferrous scrap. The weakness that prevails in the present market for steel products, extends back to the raw materials. Semi-finished steel, scrap, pig iron and coke share in the general downward movement. The June price of $1.85 per 100 lb., f.o.b., Pittsburgh, on steel bars, shapes and plates, applies to most of the large mill lots now being sold, despite announcement of $1.90 for third quarter requirements.

(All prices as of June 29, 1928)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$19.69
Northern Basic	20.89
Southern Ohio No. 2	21.19
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	25.62
BIRMINGHAM	
No. 2 Foundry	15.50
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76
Virginia No. 2	27.17
Basic	21.26
CHICAGO	
No. 2 Foundry local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	22.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20.26
Basic	19.26
Bessemer	21.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4 5
Cleveland	5.00
Cincinnati	4.30
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.00@2.10	3.50	3.25	3.90*
No. 12	2.05@2.15	3.55	3.30	3.95*
No. 14	2.15@2.20	3.60	3.35	4.00*
No. 16	2.25@2.30	3.70	3.45	4.10*
Black				
Nos. 18 to 20	2.70@2.80	3.75	3.45	4.00
No. 22	2.85@2.95	3.90	3.60	4.15
No. 24	2.90@3.00	3.95	3.65	4.20
No. 26	3.00@3.10	4.05	3.75	4.30
No. 28	3.15@3.25	4.20	3.90	4.45
Galvanized				
No. 10	2.90@2.95	4.10	3.70	4.25
Nos. 12 to 14	3.00@3.05	4.20	3.80	4.35
No. 16	3.10@3.15	4.30	3.90	4.45
No. 18	3.25@3.30	4.45	4.05	4.60
No. 20	3.40@3.45	4.60	4.25	4.75
No. 22	3.45@3.50	4.65	4.30	4.80
No. 24	3.60@3.65	4.80	4.40	4.95
No. 26	3.85@3.90	5.05	4.65	5.20
No. 28	4.10@4.15	5.30	4.90	5.45

*250 to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in., steel, butt welded.	50%	36%	55½%	43½%	54%	41%
2½ to 6 in., steel, lap welded.	45%	32%	53½%	40½%	51%	38%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—Decimal	B.w.g. and Fractions	Outside Diameter in Inches—½	⅝	¾	⅞	1	1⅛	1¼
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.50‡	4.00	4.15
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10‡	5.30	5.00
Cold drawn, round or hexagon†	3.40	3.65	3.60
Cold drawn, flat or square†	3.90	4.15	4.10
Structural shapes	3.30‡	3.00	3.10
Soft steel bars	3.25‡	3.00	3.00
Soft steel bar shapes	3.25‡	3.00	3.00
Soft steel bands	4.00‡	3.65	3.65
Tank plates	3.30‡	3.00	3.10
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%[1]

*Flat, 3/16@½-in. thick. †Cold finished steel, shafting and screw stock. ‡250 to 3,999 lb., ordered and released for shipment at one time.

Electric welding wire, New York, 3/32, 8.35c.; ⅛, 7.85c.; 5/32 to ½ 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			15.50
Tin, straits, pigs, New York			51.00
Lead, pigs, E. St. Louis	6.12½	New York	7.75
Zinc, slabs, E. St. Louis	6.20	New York	7.75

	New York	Cleveland	Chicago
Antimony, slabs	12.50	13.00	14.25
Copper sheets, base	23.50	23.50	23.50
Copper wire, base	20.12½	19.62½	16.75*
Copper bars, base	22.00	22.00	22.50
Copper tubing, base	25.00	25.00	25.00
Brass sheets, high, base	19.25	19.25	19.25
Brass tubing, high, base	24.12½	24.12½	24.12½
Brass rods, high, base	17.00	17.00	17.00
Brass wire, high, base	19.75	19.75	19.75

*At mill

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%	25.00*	22¾@24	24.30
Zinc sheets (casks)	10.00@10.50	11.00	9.61
Solder (strictly)	31.50	32.50	31@34
Babbitt metal, delivered in case lots, New York, cents per lb.:			
Genuine, highest grade			66.50
Commercial genuine, intermediate grade			53.00
Anti-friction metal, general service			31.50
No. 4 babbitt (f.o.b.)			12.25
Nickel, f.o.b. refinery, Bayonne, N. J., cents per lb.:			
Ingots 35.00	Electrolytic 37.00	Shot 36.00	

*Delivered.

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Full finished nickel sheet (base)	52.00
Cold rolled nickel sheet (base)	60.00
Hot rolled rods, Grade "A" (base)	45.00
Cold drawn rods, Grade "A" (base)	53.00

Base price of Monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	28.00	Hot rolled rods (base)	35.00
Blocks	28.00	Cold drawn rods (base)	43.00
Cold rolled sheets (base)	50.00	Full finished sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound, f. o. b. cars, depending on quantity:

	New York	Cleveland	Chicago
Crucible copper	12.87½@13.12½	12.00	11.75@12.25
Copper, heavy, and wire	12.00 @12.87½	11.25	11.25@11.75
Copper, light, and bottoms	10.75 @11.25	9.75	10.00@10.50
Heavy lead	5.00 @ 5.25	5.25	4.50@ 5.00
Tea lead	3.75 @ 4.00	3.75	3.50@ 4.00
Brass, heavy, yellow	7.12½@ 7.37½	7.75	7.25@ 7.75
Brass, heavy, red	10.00 @10.25	10.00	9.50@ 9.75
Brass, light	5.62½@ 6.12½	6.25	6.25@ 6.75
No. 1 yellow rod turnings	8.00 @ 8.25	7.75	7.50@ 8.00
Zinc	3.25 @ 3.50	3.25	2.87½@3.37½

TIN PLATES—Charcoal—Bright—Per box.

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	14x20	$12.10	$11.95	$11.50
"A" Grade:				
IC,	14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box				
100-lb.,	14x20	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box				
IC,	14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.*	$0.10@0.13½	$0.16	$0.15
Cotton waste, colored, per lb.*	.09@ .13	.12	.12
Wiping cloths, washed white, per lb	.15½	38.00 per M	.17
Sal soda, per lb	.02	.02	.02
Roll sulphur, per lb	.027	.03½	.04
Linseed oil, raw, per lb. in 1 to 4 bbl. lots	.11	.105	.11
Cutting oil, about 25% lard, in 5 gal. cans, per gal.	.65	.60	.60
Machine oil, medium-bodied (55 gal. steel bbl.) per gal	.30	.36	.36
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin.ft. per inch of width for single ply.			
Medium grade	31½%	35%	35%
Heavy grade	27%	30%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft			
First grade	45%	50–10%	50%
Second grade	50%	60–5%	50–10%

*All waste in bale lots.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0325	$0.0325	$0.0324
Cold drawn shafting	per lb.	.034	.034	.04
Brass rods	per lb.	.17	.1675	.1525
Solder (½ and ½)	per lb.	.3150	.3375	.41
Cotton waste, white	per lb.	.10@.13½	.10@.13½	.10@.13½
Emery disks, cloth, No. 1, 6-in. dia	per 100	3.10	3.10	3.10
Lard cutting oil	per gal.	.65	.65	.65
Machine oil	per gal.	.30	.30	.33
Belting, leather, medium	off list	31½%	35%	40–5%
Machine bolts, up to 1x30 in., full kegs	off list	50%*	50%*	50%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials—Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
*Flint paper	$5.40	$4.95	$5.13
*Emery paper	10.71	9.15	10.71
†Emery cloth	27.84	27.85	27.84
Emery disks, 6 in. dia., No. 1, per 100:			
Paper	1.29	1.27	1.32
Cloth	3.10	3.05	3.05
Fire clay, per 100 lb. bag	1.00	.75	.75
Coke, prompt furnace, per net ton	Connellsville,		2.25@2.50
Coke, prompt foundry, per net ton	Connellsville,		3.25@3.75
White lead, dry or in oil	100 lb. kegs	New York,	13.25
Red lead, dry	100 lb. kegs	New York,	13.25
Red lead, in oil	100 lb. kegs	New York,	14.75

*4½ reams and under. †Less than 2 reams.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

	Full Kegs or Cases
Machine bolts, square heads and nuts:	
Up to ¾ x 6-in.	55%
Larger up to 1 x 30-in.	50%
1¼ and 1¼ in. dia.	35%
Carriage bolts:	
Up to ½ x 6-in.	55%
Larger sizes	50%
Coach and lag screws:	
Up to ½ x 6-in.	55%
Larger sizes	50%
Tap bolts, hexagonal heads	40%
Nuts:	
Hot pressed, square and hexagonal, blank or tapped, up to 1-in., incl.	55%
Cold punched, square and hexagonal, blank or tapped, up to 1-in. incl.	55%
Semi-finished, hexagonal, tapped, in packages, all sizes	40%
Case hardened, hexagonal, tapped, in packages, all sizes	30%
Washers: Deduct from list, per 100 lb	$3.50*
Rivets, button and cone head:	
Small, including ⅞-in. dia	50–10%
Large (base) per 100 lb. net	$5.00†

Note—For less than full package quantities on bolts, screws, hot-pressed and cold-punched nuts, add extra of 10 per cent to list.
*Broken keg lots, $1.50 off list. †Broken keg lots, $6.50 net.

Machine Requirements and Industrial Construction

Equipment Wanted

Mich., Detroit—Automatic Products Co., 1145 West Grand Blvd. miscellaneous equipment for the manufacture of screw products for proposed 1 story, 120 x 500 ft. addition to factory.

Mich., Detroit — Midland Steel Products Co., 6660 Mt. Elliott Ave. machinery and equipment for finishing auto brakes for proposed 1 story, 90 x 300 ft. factory. Estimated cost $600,000.

Mich., Detroit—Motor Products Corp., 11801 Mack Ave.—equipment for the manufacture of metal stampings for proposed addition to plant.

Mich., Pontiac—Oakland Motor Car Co.—equipment for making and cleaning iron castings for proposed 1 to 3 story foundry at Baldwin and Joslyn Roads. Estimated cost $2,000,000.

O., Troy — Miami Specialties Inc., S. S. Franklin, Mgr. metal working equipment including drill press, slotter, buffer and polisher, etc.

Pa., New Castle—Bd. of Education—lathes, tin shop equipment and woodworking machinery.

Pa., Pittsburgh—Bd. of Education, Fulton Bldg.,—six 9 in. lathes, 12 in. shaper, 20 in. drill, hack saw, electric grinder, tool post grinder and woodworking machinery for Baxter Jr. high school.

Pa., Pittsburgh — Pittsburgh Crucible Steel Co., Oliver Bldg.—25 ton electric crane with 5 ton auxiliary.

Ont., Mount Dennis — Firstbrook Bros., 283 King St. E.—equipment for the manufacture of boxes for proposed factory. Estimated cost $300,000.

Ont., St. Catharines — Kimber & Hillier Mfg. Co.—18 to 20 in. lathe, 8 ft. bed, milling machine, large drill press and 2 ton chain block.

Ont., Toronto—Link Belt Ltd, 791 Eastern Ave.—three cranes, one 10 ton, 45 ft. span, one 3 ton, 30 ft. span and one 5 ton, 30 ft. span for proposed 1 story, 105 x 160 ft. factory and machine shop. Estimated cost $60,000.

Mexico, Sonora, Empalmex—S. M. Houston, Supt. Motive Power, Ferrocarril Sud-Pacifico de Mexico—machine for finishing standard A.R.A. Journal bearings, after they have been babbitted, also two 5 hp. floor tool grinders, size of wheel 2 x 16 in. one 200 amps. single operator arc welder, one 16 in. heavy duty engine lathe, 8 ft. bed; above machinery to be furnished with individual motor drives 230 d.c. voltage.

Opportunities for Future Business

Ala., Mobile—General Cable Corp., 420 Lexington Ave., New York, N. Y., plans the construction of a factory for the manufacture of electrical wire and cable here.

Calif., Oakland—C. W. McCall, 1404 Franklin St., Archt., is receiving bids for a 1 story, 50 x 115 ft. auto service building at 29th St. and Broadway for Weaver-Wells Co., 3321 Broadway. Estimated cost $150,000. Noted Jan. 12.

Calif., Placerville—School Board, will receive bids until July 12 for a 2 story, 75 x 250 ft. school including manual training shops, etc. on Memorial Park. Estimated cost $160,000. Davies-Pierce Co., 47 Grant St., Stockton, Archt.

Calif., San Francisco—Yellow Cab Co., 1290 Bush St., awarded contract for a 3 story garage at Jones and Turk Sts. Estimated cost $325,000. Noted June 28.

Calif., South San Francisco—Pacific Coast Steel Co., Hunter-Dulin Bldg., plans a 2 and 3 story 80 x 1508 ft. machine shop. Estimated cost $600,000. Private plans.

Conn., Bridgeport—Bullard Machine Co., Brewster St., awarded contract for a 2 story, 100 x 120 ft. addition to foundry on Brewster St. Fletcher-Thompson Inc., 542 Fairfield Ave., Archt.

Conn., New Britain—Fafnir Bearing Co., awarded contract for the construction of a 6 story, 60 x 290 ft. factory.

Conn., Waterbury — Farrell Foundry & Machinery Co., 453 Bank St., awarded contract for a 2 story factory. Estimated cost $200,000. Noted June 21.

Ind., Muncie—Warner Gear Co., awarded contract for a 2 story factory and 1 story, 150 x 250 ft. machine shop. Estimated $75,000 and $50,000 respectively.

Mass., Chelsea (Boston P.O.)—Beaudette Mfg. Co., Crescent Ave., manufacturers of loud speakers, is having plans prepared for a 2 story addition to factory. Schein & Levine, 448 Broadway, Archts.

Mass., Hyde Park (Boston P.O.)—Compressed Steel Shafting Co., 1587 Hyde Park Ave., awarded contract for a 1 story addition to factory.

Mass., South Boston (Boston P.O.)—Hunt-Spiller Mfg. Co., 383 Dorchester Ave., awarded contract for a 1 story, 45 x 75 ft. addition to factory for the manufacture of gun iron castings.

Mass., Somerville (Boston P. O.)—American Radiator Co., 129 Federal St., Boston, awarded contract for a 1 story, 75 x 165 ft. plant on Park St. Estimated cost $50,000. Noted June 28.

Mass., Swampscott (Lynn P.O.)—F. I. Richardson, 26 New Ocean St., is receiving bids for a 1 story, 70 x 150 ft. repair and service garage at Kings Beach. Estimated cost $50,000. Private plans. Noted June 14.

Mich., Detroit — Forham Tool Co., c/o Lane Davenport & Peterson, Charlevoix Bldg., Archts., plans the construction of a 2 story, 60 x 60 ft. factory on Woodrow Wilson Ave. Estimate cost $75,000.

Mich., Detroit—Packard Motor Car Co., 1580 East Grand Blvd., awarded contract for addition to aluminum foundry. Estimated cost $100,000.

Mo., Bridgeton — Bd. of Public Service, St. Louis, plans an election August 7 to vote $2,000,000 bond issue to finance acquisition of Lambert-St. Louis Flying Field including administration and air service buildings, etc. here. B. Russell Shaw Co., 4616 Lindell Blvd., St. Louis, consit. engrs.

Mo., St. Louis—R. E. Mohr, 1765 Railway Exchange Bldg., Archt., will soon award contract for a 1 and 3 story, 56 x 640 and 82 x 140 ft. fruit exchange building, administration building, etc. for Wabash Ry. Co., 1765 Railway Exchange Bldg. Estimated cost $850,000. R. H. Howard, Ch. Engr.

Neb., Omaha—Nebraska Power Co., 17th and Harney Sts., is having plans prepared for a 2 story, 61 x 85 ft. garage and service station at 43rd and Leavenworth Sts. Estimated cost $30,000. F. S. Stott, 707 World Herald Bldg., Archt.

N. J., Carlstadt (Rutherford P.O.)—Koeppen Metal Products Inc., 361 Manhattan Ave., Union City, plans the construction of a 2 story, 80 x 350 ft. chromeum plating factory here. Estimated cost $60,000. Engineer not announced.

N. J., New Brunswick—Bd. of Vocational Schools of Middlesex County, O. E. Parsil, Dir., Easton Ave., plans the construction of a 3 story vocational school. Estimated cost $200,000. Architect not selected.

N. Y., Buffalo—Dupont Cellaphane Co., River Rd., plans the construction of a factory. Dupont Engineering Co., River Rd.

N. Y., Lancaster—J. H. McElvein, 263 Terrace Bldg., Buffalo, will soon award contract for the construction of a maintenance building at Erie County asphalt plant here. C. E. Speich, Archt.

N. Y., Mariners Harbor (Staten Island P. O.)—Gulf Refining Co., 21 State St., New York, is having preliminary plans prepared for a new refinery, comprising nine units with machine shop, etc. Facilities will be provided for handling crude oil from seagoing tankers, including pumping machinery, etc. Estimated cost approximately $20,000,000.

N. Y., New York—J. P. C. Realty Corp., J. P. Carey, Pres., Grand Central Terminal, is receiving bids for the construction of a garage at 338 East 48th St. Estimated cost $90,000. A. J. Thomas, 2 West 46th St., Archt. Noted June 21.

N. Y., New York—Mulliner Realty Corp., Freiden, Pres., 1875 Garrison Ave., had plans prepared for a 1 story, 95 x 100 ft. garage at Mayflower and Wilkinson Sts. Estimated cost $40,000. C. S. Clark, 441 Tremont St., Archt.

N. C., Charlotte — City Commission, authorized $1,490,000 bond issue to include municipal garage, etc.

O., Cleveland—Federal Foundry Supply Co., R. Ditty, Pres., 2639 East 79th St., is receiving new bids for a 1 story, 90 x 260 ft. factory at East 71st St. and Belt Line R.R. E. A. Weil & Co., 2725 Prospect Ave., Archts. Noted June 28.

O., Cleveland—Gears & Forgins Inc., 2952 East 92nd St., awarded contract for a 1 story, 50 x 132 ft. forge shop at 2952 East 92nd St. Estimated cost $40,000.

O., Cleveland—Ohio Foundry Co., W. H. Smith, Pres., 9806 Quincy Ave., awarded contract for a 1 story, 150 x 200 ft. factory. Estimated cost $100,000. Noted June 14.

Ore., Portland—Southern Pacific Ry., 65 Market St., San Francisco, Calif., awarded contract for a blacksmith shop, electric repair building, etc. here. Estimated cost $42,000. G. W. Boschke, Ch. Engr.

Pa., Philadelphia—Brown Instrument Co., Wayne and Roberts Aves. plans the construction of a 2 story, 44 x 60 ft. addition to plant for the manufacture of industrial and power plant indicating, recording and automatic control instruments for measuring temperature, pressure, fluid, flow, machine speed, etc.

Pa., Stoops Ferry (mail Glenwillard)—Homestead Valve Mfg. Co., 134 6th Ave., awarded contract for a 1 story, 50 x 50 ft. addition to foundry here. Estimated cost $40,000.

R. I., Newport—H. L. Rooney, 116 Bellevue Ave., awarded contract for a 1 story garage and repair shop on Middletown Ave. Estimated cost $40,000.

R. I., Providence—Dept. of Public Buildings, is having plans prepared for the construction of a repair shop, etc. at Whitmarsh and Dexter Sts. Estimated cost $65,000. T. J. H. Pierce, City Hall, Archt.

Wis., Rice Lake—Peckenthaler Bros., will receive bids until July 10 for a 2 story, 66 x 132 ft. garage. Nyman & Johnson, Cumberland, Engrs.

Ont., Hamilton—Hamilton Ramp Garage Ltd, Federal Bldg., is having plans prepared for a 4 story, 65 x 175 ft. garage on Rebecca St. Estimated cost $250,000. G. T. Evans, Federal Bldg., Archt.

Ont., Weston—The Arco Co. Ltd., 16 Liberty St., Toronto, plans the construction of a plant for the manufacture of waterproofing products here. Estimated cost $150,000 to $200,000. Chapman & Oxley, Northern Ontario Bldg., Toronto, Archts.

Que., Montreal—C. T. A. Hart, 1254 St. Mark St., will soon receive bids for the construction of a garage on St. Catherine St. W. Estimated cost $260,000.

Que., Quebec City—F. A. Lawrie, plans the construction of a garage on Grande Allee. Estimated cost $300,000.